<u>FERRANTI</u>

NEWS IN BRIEF

Neddy's plan on Threshold

THE Neddy manpower subcommittee is likely to recommend that the National Com puting Centre's Threshold training scheme should form the basis of increased government investment in the training of

young people.

Although the sub-committee discussed proposals for the government procurement policy to encourage software houses to develop software for British minis (CW, November 24), the final recommendation is likely merely to state that the procurement policy should take account of manpower impli-

The sub-committee does not recommend any sum for capacity fibre optic channels government investment in com-

3030 add-ons

ADD-ON memories for IBM 3030 computers will be available in Europe early next year from Telex. Manufactured in the US by Intel they come in one Megabyte modules and can be attached to the 3031, 3032 and 3033.

Takeover

COMPUTER media storage firm, Datakcep, has been acquired by the proprietors of Hay's Wharf Ltd. Datakeep stores computer stationery and magnetic tapes at its East London premises. Hay's Wharf al-ready has a subsidiary, Hay's Business Records Centre Ltd.

Expanding

SUNBURY-BASED bureau and software house Systemsolve has achieved a turnover of £500,000 this year, and the expanding company has opened a branch office at Manchester.

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3030 pricing policy 'changed rules'

gence of the Japanese computer industry wero two of the key events of the last year, according to Logica director Philip Hughes.

The 3030 pricing policy "changed the rules of the game," he believes, and could signify that IBM was planning to shift more into the services rather than the manufacturing business. He also pointed out that Fujitsu was now challenging DEC for No 2 place

Hughes was speaking in London last week to setting of the ACM chapter of the BCS.

He reiterated the main points he made in an article arlier this year shortly after returning from a year's sabbatical leave (CW, July 21). These were the

minis from mainframe manufacturers; and the Ja-

Since then, he said, the significance of the 3030 cuts had omerged. Pointing out that IBM's profitability last year was 27 por cent, he said that IBM had the leeway to cut its hardware prices. But to maintain the profitability it was accustomed to, the poration had to find new sources of revenue.

He said that he believed IBM would be moving into the services business in the sense that it would the offering tallor-made solutions to problems, in the same ways as current systems houses and bureaux.

But he pointed out that this would require a major shift in IBM ways of working and could be limited by the availability of suitable resources. What Amdahi thinks of the price cuts . . . page 20.

resignation of the company's deputy chairman.
For the first half to September Mercia Building Society which has ordered a model 64/30 valucd at £300,000 to replace in 30, Racal's profits are up 68% to £19.4 million on turnover up 75% IBM System 3. at almost £90 million compared with the same period last year. Pre-tax profits of £45 million for

the full year are forecast, which compare with £32.7 million last Racal's Milgo acquisition, which had been expected to depress the company's overall profitability, is now looking much healthier with the forecast for the year revised up from £7.5 nillion to £10 million.

Deputy chairman of Racal Electronics, Oliver Prenn, has resigned. He had been with the company since 1969.

New range

DATA General's RJE80 and Hasp II IBM emulation packages can now be run on the 16-bit microNova microcomputer family following the introduction of a new range of communications enhancements. In addition, separate emulation packages permit the microNova to communicate with any Data General or IBM host processor.

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Computer Weekly for 1977 and the editorial and adver-

lising staffs wish all their friends in the industry a

Happy Christmas. We thank you all for the

kelp and co-operation we have enjoyed during the past

year and look forward to

further success in the New

Japanese

hardware

afacturers could be a target

for UK software and services

companies. Computing Services

Association director-general

Alan Benjamin visited Japan

recently and was impressed by

the interest shown in British ser-

vices companies.
An American consultant to

Fujitsu, Dr David Freeman, also

recently emphasised in an ex-

clusive Computer Weekly in-

terview that the Japanese

require software, marketing and

inguistic expertise to back their

frive for a share of the computer

business (CW, October 13). Any

moves to enlist government

support for such projects could

run into opposition from

management and unions of

British companies who are

afraid of any possible effects on

than £1 million a year, the Data

Recording Instrument Co is to supply ICL with its Model 6320

matrix printer. This runs at 60

chps and will be used in ICL

terminal systems in place of the

Terminet printers that the US

based General Electric has

PLANS to include a system for Schedule D self-employed in-come taxation on the ICL 2970

have been shelved, Financial

Secretary to the Treasury Robert Sheldon told Mrs Mar-

garet Bain, MP (SNP, East

Dunbartonshire) in a written Parliamentary answer.

WHILE the Data Protection

will E the Data Protection Committee nears completion of its work (CW, December 1), a format first reading was given in the House of Commons last week to a Bill aimed at providing legislation relating to information held on government computers. Introduced by Labour MP Ronald Atkins, the Preedom of Information Bill is due for its second reading on February 8.

Information Bill

frame at the Cumbernauld Inland Revenue accounts office

Tax plan shelved

target

JAPANESE

 $(V^{(n)})^{-1} du d_{\mathcal{F}} F_{\mathcal{F}, k, k, k}$

Number 580/1

Thursday, December 15/22, 1977

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Hughes . . . key events of this year. Public data nets in PO plan for 1980s resigns

Post Office data communication services includes a possible all digital circuit-switched public data network by 1985 and highcarrying everything from colour television to gas and electricity

meter readings in 30 years' time. In the immediate future, the go-ahead for a national public acket-switched network is ikely to be given in January. when the Post Office Board meets to discuss the final proposals for the network. The usage charges for the network are likely to be distance-

independent, although there will be distance-dependent access These pointers to the future were given to users attending seminars conducted by the Department of Industry's National Committee on Computer Networks in London last week. The

speaker was Brian Cross, head of the NP4 network planning group in Post Office Telecom-A wide range of enhance-

ments to services was forecast by Cross, including the appointment of data services managers in Post Office Telecommunications to look after the interests of users.

'Word processing and electronic mail are on the way, and

THE shape of things to come in electronic funds transfer systems are likely to be the most significant development," he

Digital links would be greatly increased in the trunk and junction networks over the next few a long way off.

A circuit switched network would only become feasible once there was a wide penetration of digital links, and to start with its geographic coverage would be restricted. More immediately, Cross saw

an expansion in the number of databases accessible from the UK, and further improvements in Datel were coming. "The 12-month forecasts for accesses to transatlantic data-

bases were exceeded in three months when we introduced the links to Tymnet and Telenet earlier this year and we are introducing an X25 public packet two networks

switched access service, initially just to the US, though it is likely to extend to other places later,"

"We will be introducing Date! soon after. At present full duplex years, but digital links from the on the switched network is only office to the local exchange were available at 300 bps, but it will be enhanced to 1200 bps next year.'

> The public packet-switched service is likely to have nodes in London, Manchester and Birmingham and six other multiplexer access points to start with (CW. October 27). As revealed earlier this year (CW. July 21), it is also likely to be based on the microprocessorcontrolled switching technology developed by TRT in France for Transpac and also being used in Euronet. However, UK minicomputers could replace the Mitra 125 minis which are used

£1.5m minicomputer turnkey contract goes to CORT

ONE of the biggest single minicontracts placed in the UK, with simultaneous stock allo worth over £1.5 million, has been secured by CORT, Commercial Real Time, of Twickenham. The ustomer is one of the UK's oiggest pharmaceutical wholesalers, Barclays and Sons, which each of its 28 depots.

The main application at each computer turnkey systems site is real time order processing, cation and update and invoice/ picking list printing. A notable feature of the software supplied by CORT is an English language product identification method which enables a single product s being supplied with a PDP- to be identified within two se-11/34 based configuration for conds from more than 10,000

Inter-union row on PO board

Public Servants.

The SCPS, which represents higher grades of management, including computer staff, was excluded from the workerparticipation experiment when it, the most extreme being a five of the larger unions claimed

PLANS by the Post Office to Workers and the Post Office form a new Post Office Board Engineering Union claimed two next month, including seven seats for union representatives, places each, while the Civil and Public Services Association, the ciety of Post Office Executives

cause it has been left out, it now has a number of options open to policy of non-co-operation in the experiment. It is holding a The Union of Post Office meeting today (Thursday).

are to go ahead despite protests from the Society of Civil and Staffs' Association and the So-The SCPS has said that be-

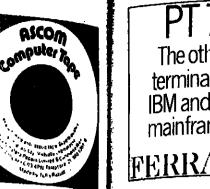
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Honeywell makes impact with Level 64

MORE aggressive UK mar-keting of the Honeywell Series 60 Level 64 computers is begin-ning to make an impact on the competitive user base. About one in five of recent sales has replaced established IBM, ICL and Univac accounts.

We also send greetings to our readers who will be with us once again in 1978, when The most recent new customer is Wolverhampton and the first issue will be published on January 5.

One factor which led to the selection of the Honeywell machine against competitive IBM and Univac tenders was the System conversion aids available 1 Level 64, Disc file formats are 1BM compatible and comprehensive facilities are provided for the emulation of various m vironments and for program

conversion. The availability of full database and transaction processing software on Level 64 is seen by Honeywell as a major seling point. The first UK users of the transaction processing nature TDS, were Bournemouth con cil and Vaux Br, weries, Sundo land, which both operate 64/2) models. TDS offers comprehe sive security features, based on the Multics system, and these were of key significance in the

Worldwide orders for Level 6 are currently approaching 1,000 in the UK, the machines are seen as competition for the recently unnounced ICL 2950. More on Level 64, pages 3 and?

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Cross joins GEC to buy US companies vestment even without the money it will get

investment, GEC has decided to channel some of it into the US, and former ICL managing director, Geoff Cross is to head a "shell" company in California to look for

GEC has been slow to invest in the US, but is now keen on acquiring companies which mesh with any of its businesses, including electronics, electrical, telecommunicatio and nuclear energy.

Computing' call

"It was the largest gathering of representatives of our mem-

bership in computer areas for

some time," said Christie. "It is

clear that unless Civil Service

management takes immediate

action in respect of both these

issues there is a danger of a

Although the Ministry of

Computing as currently conceived by the SCPS would be

concerned only with Civil Service computing, it could form

the embryo of a Ministry of In-

formation Technology, as

outlined by consultant lann

Barron at the ACM/Computer

Weekly conference at Hedsor

Barron's concept of an In-

formation Technology Ministry

would encompass all aspects of

the impact and use of the

of the industry itself and the

staff involved in working on

computer and communications

compared to 8p last year.

Christle agreed that if the

echnology, as well as the needs

Park (ĆW, July 14).

breakdown in Civil Service

Ministry of

By Robin Webster

CALLS for the establishment of

a Ministry of Computing to deal

with all computer operations in

the Civil Service, and for in-

creases of over £1,000 for pro-

grummers and analysts within

the Service, have come from the

Society of Civil and Public Serv-

The SCPS, which represents

executive grade civil servants and has 8,000 computer staff out

of a total membership of 105,000.

says that the new authority

should manage centrally the

training requirements and car-

eer development schemes of

This was needed, according to

Campbell Christie, deputy

general secretary of the SCPS,

because of growing concern

among members about the

negleci presently shown in this

The call for action came

during a conference last week,

which attempted to define the

future needs of Society members

THE incorporation of Singer's

international operations has en-

abled ICL to achieve its target of

doing more than half its busi-

For the year ended September

30, 51% of ICL's total turnover of

£418.7 million was in its

European and international div

isions. This is a 45% increase on

ast year, of which 24% came

from Singer business. The company's profits for the year

were very much as City analysts expected — up 31% to £30.3

ness outside the UK.

Civil Service computing staff.

Following a flood of inquiries about possible acquisition, GEC is not commenting on

national company is seeking a substantial minority stake, and Cross is believed to have considered the Florida-based minimaker as a possible acquisition for ICL. Although GEC may be hampered by Treasury restrictions on foreign investment,

Cross will be much less likely to be tied down by government interference than was possible at ICL (CW, November 17). GEC's managing director, Arnold

Weinstock, is understood to have hired Cross within days of Cross announcing his intention of leaving ICL for California.

Half-year tigures announced by GEC last week show profits up 19.5% to £144.8 million

for its share of the newly-nationalised British Aircraft Corp. The strength of its bank balance underlines the comparative in-

on turnover up 14% to £1,102 million compared with the six months to September 30, 1976.

Series 1 enhancements

FURTHER liberating the IBM user from attachment constraints, IBM has announced a programmable communications front-end subsystem fo the Series 1 mini which effectively boosts the power of the mini by aking over all the communications functions.

Called the 4987, the front-end allows users to accommodate both

ynchronous and asynchronous protocols in a single unit, and allows the trachment of a variety of specialised ISM and "foreign" terminals to

Available with the 4987 will be operating software which interfaces to the Series 1 operating system. It costs £220 or £3.70 a month.

Several Series 1 software products have been announced, notably Version 4 of the operating system which includes the capability of making Series 1 look like a cluster controller to an SNA network around the state of the operating system.

In May, Version 2 of the operating system will be available, and Version 3 will follow in October. They will include a debug package, automatic device back-up and terminal and systems support for Sories 1-Series 1 links, System 3 CCP RPG and System 370 DOS/V8 3TAM

Turn to page 18

Company may develop own VME/K

recently recruited several ICL regard VME/K as a better experts is considering develop- alternative to VME/B for such ing its own version of the environments. VME/K operating system for An ICL spokesman said that large-scale transaction processing systems.

SCPS version of a Ministry o

Computing was set up, the wide

implications could have an en

ormous impact, possibly leading

to a closer working between the Department of Industry and the

Central Computer Agency. The

CCA is responsible for advising

government departments on the

ise of computers

The company, South Eastern requirements and that a Computer Services, based in standard product would not sat-Kingston-Upon-Thames, has considerable 2900 experience Using VME/K as a basis, ICL's and has conducted strategy policy would be to develop studies for ICL users. SECS considers that the needs of some large scale public sector appli-cations can best be met by using VME/K as a basis for a tailor

Although VME/K is marketed by ICL at present primarily for the medium range 2950 and 2960 of Singer business and nine months from Cogar Corp. ICL systems, it is capable of being shareholders, which now inused for large-scale TP enclude many of its employees, will receive a dividend of 11.25p For the large scale 2970, 2976,

made system

According to ICL's new prime operating system supported by ICL, although it managing director Dr Chris years would be to achieve the same kind of growth that his has already used VME/K as the basis for the specially tailored VME/ESA operating system. predecessor, Geoff Gross, currently being run by the achieved during his five years of European Space Agency in Darmstadt, West Germany, on office, when turnover was almost trebled from its 1972 level of £154 million and profits rose Some users and potential

Optimisation Can enhance through put

M. Doran, Marcol Software Division on 402 9355 or write to him at The Marcol Group, 60 Queen's Gardens, London, W.2.

MUMMI

significance of the £50 million over five years to be invested by the Department of Industry in microelectronics (CW, December

Available in June 1978 at a purchase-only price of £9,671, the 4987 includes 89 special communication instructions and aupports up to 32 In April, a software product for preparing routines for the 4987 on a Series 1 mini will be available, licensed at £327, or £5.55 a month

a 370 mainframe. It will be available in 18 months' time and will cos £1.492 or £25.25 a month.

and 2980 systems, VME/B is the

The figures include a full year INSIDE YOUR CHRISTMAS CW...

ICL hits overseas target

SOME SPECIAL SEASONAL FEATURES

SOME SPECIAL SEASONAL FEATURES

This week, in the run up to Christmas, we have lightened the hard news with some esseonal features. Christopher Hodder Williams, in a specially commissioned story, explores the interaction of man and machine and the baclety in which they may live (Page 12-12-13)

Downtime's guisate thing a few packets on this Christmas tree packets on the Christmas tree there is a collection of 20 problems the reports of the information of the view which the people who (Page 40):

ALSO Computerview Poetic Focus NCB rebuff for union Michie's Christmes View Miche's Christmas View
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APPOINTMENTS-PAGES 16, 17, 23-39

haps one or two per year. large TP applications tended to Consultants working for have highly individual of the original 2900 architects. and others who worked on basic operating system development at ICL, including the VME/ESA isfactorily meet these needs.

envisaged such special deve-

lopments at a frequency of per-

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TERPRETERS-

COMPLIENCEW

reflection, and for quiet. But in the computerworld, there is little time for a pause as the rapid rate of technological advance quickens further each year.

OVER the next two years, IBM watchers expect the whole of System 370, including the 3030 series, to be replaced by DP Div-ision, while General Systems Division extends the System 30 line to supplant System 3.

The first announcements are expected in January, with the aunch of the E-series to replace the bottom end of System 370. up to the level of the 135.

Internally the 370/115 and 125 are multiple processor com-plexes, although this is largely hidden from the user. The Eseries is expected to be more overtly modular, with a range of functional processor options for handling specific tasks such as communications, peripherals control and databases.

The announcement is likely to include at the minimum a revamping of the OS/VS1 operating system to accommodate the major changes in workload mixes which have taken place since 1970. It could well, in addition, come up with a new operating system, together with the ability to run VSI and earlier systems in emulation

Whatever the software, it will emancipate the low-end 370 batch user and move him into the bright new world of transaction processing, offering him a range of distributed options. It might also incorporate some kind of advance in secondary or intermediate storage, possibly bubble memory or chargecoupled devices.
Some significant enhance-

ment in database capability is also likely, and there will no doubt be totally unexpected features in the new series.

This week Computer Weekly looks at some of the most significant events of the past year in which IBM, with its 3030 series price cuts in particular, once more sets the trend. During the year, Computerview

comments on the news and the trends as they develop. We end the year by looking ahead at some of the goodles that IBM may be unwrapping, some time in the next

The surprises IBM has in store for 1978

replacement for the line from the 148 through to the 3033 is coming. Dubbed by some the H-series, it is expected to be announced substantially by mid-1979 and must above all run MVS efficiently.

It is possible that the E-series operating system might be a subset of MVS, but much more likely that there will simply be a power overlap between the Eseries and the H-series, with considerable commonality betweeen the E and H operating systems at the JCL level.

Although it will almost certainly have considerable distribution of functions between several processors, the H-series is likely nevertheless to be a central site system, designed to support a wide range of distributed systems presumably using SNA

A key feature of H-series will be the System R relational data-base, which is likely to be presented as a compelling alternative to IMS, though whether users will rush to convert to it is open to question. It is not yet clear whether System R will include major elements of hardware or consist entirely of soft-

It is expected to be announced within two years, and a version is said to be running already at Boeing in the US. In whatever shape it finally appears, it will have to mesh with MVS, be-

Life goes on..... The NC

Ted Cluff now is the spokesman in their band;

The NCC takes a trolley to their hardware store,

Collecting some chips and ferrite rings; Sorts them away behind a standard sized door, Now let's see what the future brings.

They don't like the BCS examination face,

Abandon it and everything is grand. Ob La Di, Ob La Da, Life goes on.

Ob La Di, Ob La Da, Life goes on.

Privacy is happy in the marketplace,

Amdahl, IBM will have made an enormous investment in MVS

A bewildering array of options will be presented to 370 users, because in February IBM is due to announce DP Division's minicomputer, Orbit.

Likely to offer more power than does GSD's Series I mini at present, Orbit is also likely to be present, Orbit is also likely to be offered with more system software. Users should find it an enticing alternative to many of the conservative network products that currently make up IBM's catalogue, with devices like the 3790 transaction systems and the 3705 communicat. tems and the 3705 communicat ions controller.

On all the new products, there is likely to be a strong priceperformance improvement over the products that they replace, with labour-intensive items like software and maintenance representing an increasingly large proportion of the cost.

There is some confusion in the minds of many about the relationship between IBM's DP and GS divisions, but in mar-keting terms they are best regarded as two independent companies. What GSD does with System 3 and the System 30 line bears very little relation to what DPD does at the bottom end of 370, and some users may well be wooed by salesmen from

end of the System 3 line, and a

modernise and revitalise the top System 36 and perhaps a System 38 are likely next year, possibly incorporating some new storage

All in all then, a busy, exciting and bewildering year or so ahead for the IBM user, and anything but a quiet life for its

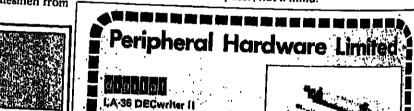
INTERRUPT.

Ode to an acoustic coupler Or what to do when the machine goes down

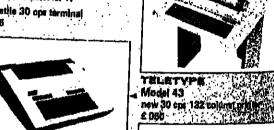
FOR Christmes, John H. Davidson of Graphic Display Systems, Cambridge, a frequent contributor to Interrupt, has burst into verse. He will the £5 interrupt prize plus a £3 poetic bonus. More poems in Downlims Special on page 14.

When I from the joy of 'coustic coupled interface am turned, By hard or software faults of gravity unknown, And when from flickering graphics screen am spurned, To wait while experts far away do groan, Then to a task of unremitting pleasure I repair: The handset from its cosy nest displaced, I whistle to the coupler some sweet happy air. In hope to make thus, artistry, on display's face: At first a line, a curve, a dainty wisp of straw, A character or two give abstract form, And then perchance a wave or mountain's drawn, And by degrees a thing of beauty's born.

But heed, dear Friends, the one who whistles first his name along the Shall then be deemed computer, not a mind.







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Ob La Di, Ob La Da, Life goes on. (with apologies to the Beatles.)

The DPC stays at home and hides away its face,

While the industry carries on as planned. Ob La Di, Ob La Da, Life goes on.

When Computer Weekly lends a hand;

Pages after pages set a stirring pace, And Focus' will be there to reprimand.

Happy is the job hunter in the marketplace,

Hard software Away in the city, where software was hard

The NCCL lends a hand;

A digit computer fed magnetic card With input and output and dynamic stop The programmers' puzzles kept them on the hop. The fuses were blowing, the wires they were lopped

Our workload exploding and holidays stopped Lord, help us tomorrow, we face the MD Said Focus "As usual, no Christmas for me." Be near me, O Fortran and Cobol and all Our systems analyst how must install A brand new computer with punch verifier And high level language to fox any liar.

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WANTED, TOP PHICES

NCR snubs union

"The determination of sales

with as an addendum to an an-

nual wage claim for field engin-

have some say in the policy

stems from concern over the

long-term interests of its

members. Also, there was some

doubt as to whether the com-

pany was going to retain an

element of mechanical business

This point was taken up by

Rex Fleet, NCR's managing

director, "After a difficult period

of transition, NCR has now

consolidated its position as a

major supplier of computers and

investment and our future lies in

achieving further growth and

vironment of EDP. There is no

going back. There is no question

"Our sales policy, our R&D

terminals." he said.

ASTMS says that the need to

Future plans include a fowl inquiry — sorry, a file inquiry — system with Seachack terminals in user

Organisations outside the currently booming

making real progress. The res-

our staff has been positive."

panies.

poultry industry that have placed orders with Redifon of late include the Nottingham Building Society and London-based magazine distributors Argus Distribution Ltd. Both are installing Redifon Redicheck

READERS buying a Chunky Chicken for Christmas will be fascinated to learn that D. B. Marshall (Newbridge), the firm that processes nearly 30 million of them every year, is now using a Seecheck key-to-disc

system from Radifon Computers for its data input.
The Seacheck system complements D. B. Marshall's existing Burroughs' B1700 computer and is being used for jobs like ledger updating, payroll, farm management statistics and order entry.

AND 21/28, 1967

THE government's Buy British policy aroused fears that the development of the UK computer Industry would be stiffed in the long term. The UK could not match machines such as the CDC 6600 and proposed 7800, and the Burroughs 83500...

Philips entered the general purpose computer market with the announcement of the Ploof family . The management structure of the BC3 was reshaped and a management committee and four divisional boards, representing bracket, membership, education and technical interests, were formed ... Polish production of computers was entering a naw stage, with serial production of Odra 1103s and 1205s.

Ten

years

ago...

COMPUTER WEEKLY

DECEMBER 14

AND 21/28, 1967

on sales policy **By Robin Webster** A CALL by ASTMS for a say in standard consultation proby looking back to traditional NCR's sales policy, included as cedures," said Don Fraser,

part of its annual wage claim director of personnel resources (CW, December 1), has brought at NCR, "There is no way that

a quick response from the com-nany. marketing policy will be accepted by the company as Normally, says NCR, it would negotiable, either with ASTMS not publicly comment on its dis- or any other outside body. cussions with unions but this policy is the responsibility of particular point needed clarifi-

part of its annual wage claim

senior management," he "NCR has an agreement with continued. "It is totally unrealistic to suggest that it can be ASTMS restricted to field engineers which incorporates delegated to periodic review at

Amdahl Corp goes public

THE shares of Amdahl Corp have been approved for listing on the American Stock Exchange, one of the two New York exchanges. The company announced that it was considering an application late ast month (CW, December 8).

"We chose the American exchange rather than the Pacific in San Francisco because it is bigger," Dr Gene Amdahl, founder of the Sunnyvale, California company told Computer Weekly. "We are not yet big success in the dynamic enenough for the largest US exchange, the New York Stock

expected early in 1978

AT&T's Bell data net

US OBSERVERS now believe at the user site. that AT&T will begin intro-ducing the so-called Bell Data Network early in 1978, although probably under another name. Service is likely to be introduced in one or two states initially, but it is intended to grow

attractive alternative to IBM's Systems Network Architecture milliseconds to four hours. concept (CW, November 10). It via a communications processor and message distribution.

It appears that, as with will be distance-independent and based solely on the volume of message traffic sent.

It will use both store-andforward and straight packetswitching techniques depending The network is a major plank on the urgency of the message in AT&T's challenge to IBM, and therefore the priority has been designed to provide an assigned to it by the user. The

Key feature of the network will allow point-to-point com- will be the additional availability munications between any com-monly used brand of terminal of software packages for things like data entry, inquiries, RJE

MORE than 30 companies have reserved stands at Microsystems 78, and the exhibition side of the event already shows promise of being a runaway success.

The organisations which see

Microsystems as a useful means of bringing their products and services to a wide spectrum of engineers, systems designers and personal computing enthusiasts, range from giant inlernational corporations down to the relatively small systems design companies which are playing an important part in the microprocessor boom.

Among the "giants" are Texas Instruments, Intel, Digital Equipment Co. and Plessey, Microsystems. But at the other end of the scale are smaller. companies such as Compelec, "

Co-Mart, and Lynx Electronics which are making their name in the personal computing field. The important area

software and systems design for

microsystems is represented by CAP Microsoft, Warren Point and Micropower, among others. Microsystems 78, exhibition Microsystems 78 exhibitors will provide spmething of interest to most microprocessor users from OEM purchasers to personal computing enthusiasts.

Those who want to know more about the Microsystems 78 seminar, should contact Christianus 1800m 1257. Dorset

seminar, should contact Chris Hipwell Room 1252 Dorsel House Stemford Street, London SEI Telephone 01-261 8738. To book stand, space at the exhibit-ion; gontact Goyd Collins at the same address, Telephone 01-261 8757, or 261 8743.

COMPUTER WEEKLY, December 15/22, 1977



"This is a message I have been The 1977 Bowling World Cup, held last week at the Charrington Bowl, carrying personally to our staff in my visits throughout the UK during the last 12 months. We Tolworth, in south west London, attracted 78 competitors from 40 countries and the computerised scoring system was provided by Atkins Computing.

It was the first time the event are always seeking to improve key matters. I believe we are

had been held in the UK for 11 ponse from the vast majority of

As the pins fell scores were in-US financial analysts currput online to one of Atkihis' Sigma 9 computers at nearby Epsom, using the terminal seen here behind the bowling lanes. Printouts listing ently regard NCR as one of the the bargaining table and dealt most buoyant computer com-

results in ascending order were output at frequent intervals and placed in front of a closed-circuit camera for display on TV monitors, The scoring system became

more complex as the tournament progressed. Software to tackle all this was specially developed in rtran and GPOS on the Sigma 9 v On-Line Decisions Inte London. Atkins points out that this firm should not be confused with On-Line Systoms, the bureau is merging.

Philips banking

A SIGNIFICANT breakthroug into the London banking market has been made by Philips with a contract for a two-processor PTS 6000 banking terminal system from Citibank's London

Citibank has installed the system at its Strand offices, and intends to use one processor for order processing and stock control of the \$800 million of travellers' cheques it issues annually. The other will be used as a six-position teller terminal system for all branch transac-

The teller system, which includes printer, keyboard and will transmit batch data daily to the bank's IBM 370/135 mainframe. The travellers cheque system, consisting o two VDUs and a line printer, will also serve as an emergency mck-up system.

Citibank has installed an enormous number and variety of minicomputers at various sites throughout the world.

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MICHIE'S **CHRISTMAS** VIEW



and 10" seconds - i.e. between

three and 30 years of con-

So readers who polished off

the problem in seconds or min-

utes are well ahead of the

program in their algorithms

whatever they may be) for

inductive logic, although

probably not in their ability to

epresent the processes expli

Children have more diffi-

culty in inventing rules. Even

at age 10 the transition from

judging everything by its con-

crete circumstances to an

ability to cope with abstracts

and hypotheticals has only just

begun. Readers might like to

ability to understand the train

try their children on their

An interesting feature of the first two rules is that a pro-

them. At the other extreme one

reader who was bitten by the

(circle counts 1, triangle 3, etc) is a factor of 60 if and only if

On the other hand the crow

that after the third it knew the

the counting horse, had a

similar faith, but the horse's art

ter's involuntary signs when the pre-set number was

For myself, I find that the

'One, Two, Many" works pre-

M, H. Halstead (1975) Toward a

theoretical basis for estimating programming efforts: Technical Report CSD-TR 143; Purdue Uni-

. Larson & R. S. Michalski (1977)

sted in reading his mas

The owner of Clever Hans,

feast was over.

the train is going West!

tinuous mental effort

Closely observed trains...

READERS were strangely continuously for between 10 stimulated by "Trains going east and trains going west" (CW, November 10) and an avalanche of rules poured in for discriminating the two

The following were the three simplest rules found by Larson and Michalski's inductive learning program:

(i) if there is a trianglecontaining car immediately followed by a polygon-containing car then Eastbound else Westbound (polygons of course include (ii) If there is a short closed

car then Eastbound else (iii) if there are two cars, or if there is a jagged-top one then Westbound else East-

gram knowing nothing about counting could still have got Out of a total of 72 readers' ntries, no fewer than 44 hit on rule (iii), and six others offered version of this same rule counting bug found that the number of sides in the cargo based on counting axles or

Amazingly, only three entries corresponded to rule (ii). in many ways the simplest.

wheels rather than trucks.

We sometimes forget what A fourth entry could be an elaborate trick counting is scored as (ii) except that the "At first thought," writes L. L. various kinds of short closed Conant, "it seems quite inconcars were separately listed in-stead of being given as a single description! No entries clicked ceivable that any human being should be destitute of the power of counting beyond 2 with (i), but some were at least But such is the case; and in a as terse, such as: few instances languages have if there are more than two been found to be absolutely destitute of pure numeral

kinds of freight, then East-bound else Westbound produced by two readers.

has been said on good evidence to count up to four. Lichten-How do we compare the efficiency of this Pascal probert's belief about his nightgram running on the CDC Cyber 175 with the ponderings ingale seems less well founded. He gave the bird of Computer Weekly readers? Computation time was three mealworms every day, one at a time, and remarked

around 10 seconds. The Cyber can be credited with appoximately 10 million instructons per second, making a total outlay of 100 million nstruction-executions. J. M. Stroud

cited by Halstead; the number of binary discriminations per second which the human brain can manage at a sprint is about

Australian aborigine system of Although Edsger Dijkstra tty well for most purposes, was once clocked at 50 per although when applied to the second for a three-minute number of shopping days to Christmas it tends to cut burst, for mortals a more relaxed average of 10 per things a little too fine. On that second can probably be assumed. So how to relate the execution of one Cyber 175 instruction to the making of thought let me wish all readers the merriest of Christmases, and a Happy New Year. one binary comparison?

At this point I close my eyes and declare that one instruction-execution is worth more than 10 and less than 100 binary discriminations (BDs). If this be so, then the Sarson-Nichalski program required a total of between 10" and 10"

MAN first used his fingers for counting when he needed to quicker and could handle higher numbers with two main aims: first, efficiency; second, more time for leisure.

around Man have grown more sophisticated with those two aims in mind. First the abacus, then came the mechanical aids such as Babbage's calculating

Then came a great advancement in calculating machines, a machine capable of doing calculations in a fraction of a second, the computer.

From first generation valves to third generation integrated circuits the computer was developed with the same two aims in mind, and now the computer can do calculations in microseconds.

But what about the future? I think four main things will change in the future due to the computer: safety, travel, public services and dangerous jobs. Although having computers

checking computers is not economical, I think that in some cases it is essential for reasons of safety. Although some manufacturers claim that their computers are infallible they sometimes do go wrong. In the case of a Jumbo Jet for example. With pilots in the jet and personnel in ground control the passengers are quite safe.

With pilots and onboard computer in the jet and personnel in ground control the passengers are safer still. But with pilot and onboard computer in the jet and computer with one or two men checking in ground control, a crash would be exceedingly rare.

I think planes carrying 400 or more passengers should adopt this latter system in the future.

Additionally, as far as railway tracks are concerned, sections near platforms and bridges should be rigged so that when a person falls on to the rails a message reaches the train on the

This could be done by a computer. When a person falls on to the rails a monitor detects the fact this has happened and since it is connected to the computer, a message can reach the train in microseconds enabling the emergency brake to be pulled.

When we discover how to split up matter and reassemble it anywhere in the universe, com-puters full of IF and GOTO statements will take complete charge of the whole operation.

In fact the most luxurious and eisurely way is the safest way, leave the work for computer controlled robots (CCRs) and computers. All we would have to do would be to program them and save our talents to provide to be executed by robot. construction workers. Also to circuit television — computers aren't infalliblet

In the not too distant future we will still use the old 1977 rails. There would be one main control point from which a computer would separate. All the trains would have TV cameras located at various spots on the chassis which would be connected to the computer.

Further on in the future monorails, due to their speed and position high above the land, will probably be in use. with virtually the same system as the "old" trains. Space travel would use com-

Space travel would use computers to their greatest advantage. This is mainly due to the fact that space flights will take required. So long that we will need to put our astronauts in suspended an would be protected by some imation. While they are in sus kind of forcefield so they would.

FUTUREVIEW

MAN first used his fingers for counting when he needed to keep a record of something, for example sheep. As his herd grew his counting method became first, efficiency; second, more time for leisure.

As time has gone by, things around Man have grown more rophisticated with them more rophisticated with them. run by robots...

> pended animation who controls the ship?

> The obvious choice is the computer or a CCR if necessary. My choice would be to have a computer. Also what must be taken into consideration is the fact that energy must be conserved. So I suggest a kind of "Brain" Computer, When the crew is awake the computer performs such operations as calculating ETAs.

But when the crew is in suspended animation an extra part of the computer is linked in, which steers the ship and avoids obstacles; however, when it cannot handle the obstacle it wakes the crew. This arrangement of the com-

puter is rather like the conscious and unconscious mind of the human brain, with this difference: the most important function computers will be used for in space travel is avoiding catastrophes in microseconds by calculating faster than man will ever do.

A community of robots, computers and humans involved together in a reliable, workable and economical system. That is the Futureview of 14year-old David Browett, of Coventry, who won the Young Computer Scientist of the Year award, organised by the Coventry branch of the BCS.

David believes that a machine take-over of the world is inevitable. He shares this belief with two other Futureview contributors, Arthur Clarke (CW, November 10) and Isaac Asimov (CW.) October 13), in this extract from his winning essay.

As computers get more advanced they will dominate the control systems of space ships. As in "2001: a Space Odyssey" (by Arthur C. Clarke) the computer will run the whole ship. But there is a lesson: never build a perfect computer.

A perfect computer will be a computer of our own image. This means it will be prone to experiencing something like human emotions: it might get check via scanners, closed angry or bored or eventually go completely mad,

As man dominates the universe he will discover more and more planets. Some of these are bound to be able to sustain life and these life forms might deve-lop into civilisations. Man being alone in his search, will be definitely interested in promising life forms but he cannot leave men on every planet that he

So how can their life forms be monitored? The answer is a mini rocket

housing a computer. Such conputers will monitor and relay data back to Earth and, in ad-

not be damaged by the the computer would send data to "natives". If intelligent life did the CCRs in security and these evolve the force would act as an would arrest, or in extreme intelligence test. When they (the cases, kill the intruder. I do not allens) broke through the force mention medical services befield the computer would send cause I don't think anyone one last message back to Earth would like a CCR poking around that intelligent life had evolved. in our insides — except another CCRs will dominate the emer-

gency services in the future Who wants to blow their mostly because both fire and brains out for the sake of a police services involve a degree plane? I think dangerous jobs danger. Imagine a fire in a such as the job of the test pilot house. The firemen pour on should be undertaken by a com-puter or a CCR if needed. One foam and man ladders. They climb the ladders and smash the reason for this is the question of windows with hatchets. They reliability. When you are testing climb through, pick up the vic-tim and climb down the ladders a million pound plane you want no mistakes, holding the victim in a fireman's By programming a computer you can hope for such reliability,

During that episode the fireman might be overcome by fumes or the fire might cause a plank of wood to fall on him; he might even have to climb into un asbestos suit before he rescues the victim

A CCR would walk up the wall, smash the window with its

fist, pick up the victim in a firm grip, and climb back down, not bothering about the fumes or anything of the sort,

As far as the police are concerned, let us imagine a crook raiding a bank and then a policeman coming in and spotting him; the crook would fight him or run, standing a reasonchance of escape, A CCR. however, would spot the crook and grip him, then take him to the police station to lock him up. As simple as that.

The CCR might fire ropes to render the criminal helpiess or. in the case of organised crime, it would be armed.

The fact is, we don't have materials on our planet is keep going, in industry, science just a few which come to mind. So to keep our civilisation as it is we must mine other planets. And CCRs are parfect for the job, allowing humans to live in comfort. There would be three types of CCRs used by the police. First a tracked body-type structure with radar and firing ropes. Second, a senior humanoid CCR which would deal with inquiries and the more sophisticated crooks. comfort.
Those jobs such as a faciory
worker checking bottles could
quite easily be done by a could Thirdly an armed CCR in numanold or tracked form.

Using computers in the in whose world there is no What have described is a privacy. I wouldn't carry it that entire community of CGR establishments and military wouldn't reliable.

establishments and military volved together in a reliable bases.

One workship and economical workship and economical workship and economical workship and economical works.

If these monitors linked to the tem one which i think works.

NEWS IN BRIEF \$104m French exports to US

'When we discover

how to split up matter

and reassemble it

anywhere in the uni-

verse, computers full of IF and GOTO state.

ments will take comp.

lete charge of the

whole operation."

also radio control could be used

but it could go wrong more eas-

testing many different kinds of

A humunoid-type CCR work

By then a computer. If you are

aircraft a CCR would be better.

sit in the cockpit like a pilot-

and if the plane crashes you

have not lost a life. They could

also be used in atomic plants of

In the future Man will have a

lot of time for leisure, and be

lieve that every man/woman

will own a CCR or else a group

You will wake up, program

your CC'R for the day's work and

rest for the remainder of the day.

You might telephone a friend

using the new computer

operator which offers a quick

and reliable service, or plug you

computer link to the library

circuit and, using a VDU, read

a book (which in actual fact the

computer is scanning and transmitting into your link.)
You might plug your computer link into the information

circult and read from your usua

display unit the weather, traffic

football results, almost any

type in your needs and slot the card into the transmitting unit. The information is read by the

computer and dispatched to the

local supermarket. The food is

loaded onto a CCR and the cost

is registered in your account it unloads the food at your house

and returns back to the siper

What CCR could do in species unimaginable. It wouldn't need oxygen or food, enabling it to

stay working until it ran out of

The fact is, we don't have the

information, cricket scores,

Next your shopping: you will

rigs — in fact, anywhere

will share a computer.

BENEFITS to France of having Cil-Honeywell Bull manufacturing mainframes, mainly Level 64, for export to the US, are underlined by US Department of Commerce import-export figures. The Department estimates that in 1977 France ex-ported \$104 million of computer equipment to the US, whereas the UK exported only \$32 million. Even Italy, with Honeywell building Level 62 there, did bet-ter than the UK, managing \$44 million of exports.
In the reverse direction, the

UK imported an estimated \$396 million of equipment, France \$300 million and Italy only \$98

£600,000. They replace IBM 3270s and are part of a plan to link all the Royal's offices to its two IBM 370/158s at head office in Liverpool.

Pantherpicks ABS

AN Allied Business Systems Multibus computer has been installed by Panther Westwinds, the prestige car maker. The £40,000 system features 48K of

Gas Corp order

THE British Gas Corporation has ordered £100,000 worth of equipment from Taylor Instrument, of Stevenage, to be installed at the liquidation and storage plant to be built on the Isle of Grain. The Taylor Quick-Scan 1300T and 1300R electronic transmitters and controllers will measure and control temperature, pressure and flow throughout the plan

ADDS' profits up

REPORTING profits up 17% at \$3.84 million on turnover up 37% at \$22.6 million for the first nine months of 1977, Applied Digital Data Systems of Hauppauge, New York, noted that during the July to September quarter, deli-veries to NCR represented 41%

Takeover

THE bid by Microdata for CMC Ltd has been accepted, and the US company has acquired 75% of the operation for \$4m. Ray Parry, chairman and managing director, remains as chairman and becomes president of CMC Europe; Irvine Ella becomes CMC managing director; and Don Fuller, president of Micro-data, and Gary Liebel join the CMC board.

PO merger

MERGER of the Post Office Data Processing Service with the telecommunications branch. recommended in the Carter ommittee report on the future of the Post Office, is to be implementedinext April.

Aigh-speed bus A HIGH-SPEED inter-computer

bus is the key to a multiple-processor functionally distributed system concept announced by Datapoint in the US. It will be launched in Europe at the Datapoint users conference Birmingham next April. The bus can be up to 2,000 feet long and carries data at 2.5 Megabits per second.

2900 sales

STATISTICS on world sales of ICL's large 2900s at September 0, 1977 show that there were 23 2980s worth £62 million installed and on order. The 2976 order book stood at eight, worth 612 million, the 2970 at 42 worth 682.4 million and the 2960 at 98, valued at 686.8 million.

would have to go somewhere. Also our technological snobbery was taking our exper-tise into non-marketable blind

Martin Banks reports on the Impact of Electronics Conference

The operator of this IBM 3250 graphics display system is using the light pen and program function keyboard (left) to manipulate data on the screen of the 3251 display station. He uses the alphanumeric keyboard

(right) to annotate the picture and to input data to the system.

INDUSTRY must rapidly come to terms with the capabilities of electronics or risk the real

possibility of "going under".

his was one of the themes to

emerge from the Impact of

Electronics Conference, organ-

ised by Electronics Weekly and

held at the London Hilton last

The 150 delegates were told

that the microprocessor, for

example, could easily become

UK industry's "black death" if

its current inflexible and com-

placent attitudes were not

changed.
Alex d'Agapayeff of CAP pul-

led few punches in an emotional

presentation. "Europe is so in-

flexible and complacent," he

said. "There is an almost

Canute-like belief in static mar-

kets that technological devel-

opments cannot change. We

think that exports don't matter

and Japanese imports don't

count. In fact many people now buy Japanese to get quality pro-

And the automated office?

d'Agapeyeff attacked the

attitude held by many that says

"I have an automatic right to my own secretary." The UK, he said,

had an idee fixe that the auto-

mated office was pure Holly-

wood fiction and not a practical

reality, a point made earlier in

the day by David Kohler, of IBM.

d'Agapeyeff suggested that 1979 could be disaster year for UK

industry, and gave one or two

pointers. US car manufacturers,

or example, were heavily com-

mitted to using micro-processors in their 1979 models,

yet America had a falling birth-

rate. These cars (almost cer-

tainly better than UK models)

"We make the best radar in the world, but still import washing machines - which is more important," he said.

Other speakers, such as Ken Corfield of Standard Telephones, and Dr Alfred Prommer of Signens, pippointed some of the real effects that electronics and computer-based technologies will have on industrial employment.

In telecommunications for example, the application of computer techniques were already changing not only the capabilities of the system, but the way the system was manufactured. The industry had to face up to major structural changes, and these inevitably meant unemployment. This pattern would be repeated in

many other industries. According to d'Agapeyeff, there are four main areas in which the micro should be exploited, to improve product quality and lower cost, to manufacturing change techniques, to improve and speed up administration, and to improve selling and mainten-

Industry must learn to exploit micros," he said, "and experts must be used." This meant using the DP department for programming, rather than letting other engineers re-invent some very basic and ancient Industry, he said, must learn

to budget for retraining and development work in micro ex-

for the development of the

company's operations in the banking and financial fields. He

leaves a widow and three child-

Matthews joined Peat Mar-wick Mitchell in 1959 and be-

came an executive partner in

1968. He leaves a widow and

I wo die in plane crasn AMONG those killed in the 1971, and had been responsible

crash of the hijacked airliner in Malaysia on December 4 were Harold Godfrey, London region manager of Dataskil, and Donald Matthews, a partner in the management consultancy Peat Marwick Mitchell. Both were visiting the Far East for Godfrey Joined Dataskil in daughter.

ITT mini controls power

BULK distribution of electricity In the Central Electricity General Automation SPC-18 Generating Board's North West system called by ITT the 1850; Region is being controlled by an and displayed on 20 VDUs and ITT computer system based on on mimic Wall diagrams. Worth the hardware of the 9400 ADX message switching system and message switching system and programmed mainly in Coral and 15 the first of a new standardised design adopted by switching are and power flows is the CEGB. in the Central Electricity

General Automation SPC-16

Improved IBM graphics

rovements over the IBM 2250 interactive ics display system offered by its successor, the

3250.

The 3250 was developed for IBM by Sanders Associates under an agreement made early this year to settle Sanders' anti-trust sult against IBM (CW, February 3), and is being manufactured by Sanders at Nashua, New Hampshire. This is under the direction of IBM's plant at Rayleigh, North Carolina, and the IBM laboratories at Hursley in the UK.

Some of the other display improvements over the 2250 provided by the 3250 include four different therefore alzee, compared with two go the 2250, the

character sizes, compared with two on the 2250, the use of eight strokes to form each character, instead of four, and four different line types — solid, dashed, dotted and dot-dashed.

Another important difference is the use of two levels of control instead of one. The 3258 control unit connects directly to the interface channel of the host mainframe and can drive up to four 3255 display controllers located up to 5,000 feet away.

ploitation, and the nation's oil

revenues must be used positi-

vely, not to subsidise inefficient

and outdated industries.

Each 3255 has a 32K refresh memory and handle

splay stations. The 3251 comes with a 21-inch display, an alphanumeric keyboard, a hand held light pen and a program function keyboard. The latter has back ighted keys which enable the host mainframe to

guide the operator.

Despite the more complex control provided by the 3250 and the other improvements over the 2250, it costs less than the existing system even with only one display station, IBM quotes £130,575 for a 3250

IBM points out that the 3250 is generally compatible with existing 2250 applications programs and is supported by its Graphics Programming Services package, and its Graphics Sub-routine Package, both

 A tough competitor for the 3250 could arrive on the scene next year in the form of the interactive graphics display system that Calcomp is developing around the Solar minicomputer, SEMS.

ITT 'replaces' IBM MAIN UK offices of the Royal Insurance Group are to be equipped with 1TT 3280 VDUbased systems worth over 6600.000. They replace IBM **Poly pioneers** new network death' of UK industry

AN ambitious multi-access network project, including one of the first ICL 2960s running System 4 programs under DME. is under way at North Stafford-shire Polytechnic.

The 2960, which also has links to a 2904 and a GEC 4082 mini. all installed at sites in Stafford, will support 32 terminals. A further 4082 is planned for installation at Stoke, while another is likely to be at Bea-

CAP-CPP

everything now," he said. "If

your company makes something

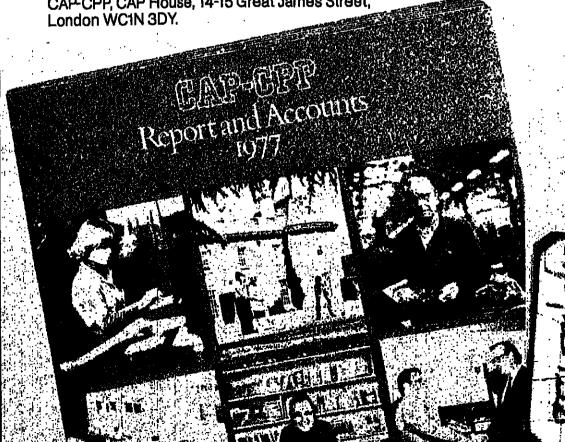
may have an application for

A complete service to computer and microcomputer users

CAP-CPP, Europe's leading software house, has made remarkable progress in 1977. The highlights are:

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- * Turnover increased by 94%: professional staff by 25%.
- * A world lead in microcomputer software.

For full details of the Group's services and progress, write for a copy of this publication to: Meinard Donker, CAP-CPP, CAP House, 14-15 Great James Street, London WC1N 3DY.



Inductive inference of VL decision rules. ACM SIGART Newsletter. No.63, 38-44 BDs, the equivalent of thinking.

GILB'S MYTHODOLOGY

Spare parts strategy for programs

Fortunately for the rest of

YOU are responsible for the different bugs, the old version. online project, or its maintenance. When the inevitable system breakdowns occur due to program bugs, you know that it is important to all users of the system that the programming team can diagnose the source of the error, correct it, retest the entire system, and then at the end of two to 20 hours, with luck, you can put the real time system back on the air again. With the best available technology and a lot of luck this will only happen once a week or once a month.

I know this will sound incredible, but I recently received technical papers from software specialists who are responsible for the safety systems of atomic power plants. They clearly thought that the solution to their reliability and maintenance problems was through structured programming. Anti-pollution forces take note!

Needless to say, in panic (my own life was at stake) I offered to visit them at my own expense and set them straight. I am much relieved to say they accepted, and part of what I told them is the idea below.

The basic idea is very simple. acts as a spare part for the clear story. other. The basic assumption is that both are well tested and that whenever a bug does occur in one of the program versions, then exactly the same bug will not usually be present in the spare part version.

We do this with computer hardware, and with the software known as files, and if you Rolls-Royce, and a lot cheaper. already paid for since it think about it we have actually been practising this technology on a wide scale with programs for years.

You don't believe me, do you? Think about what a systems programmer does when the application coding cost would be an acceptable in amount of test cases. And who he unexpectedly encounters a crease in the project budget, if among you can automatically bug in the new update of the it resulted in almost immediate supplier's software. He goes back to the spare part with the spare part method.

Similarly, when converting us there is a good reason to to new programming langu- believe that we can afford the ages on the same system, we spare part software too. Exare naturally prepared to perience plays surprising tricks revert back to the old version, on our intuition. Would you even if it does run slower and is believe that writing two proless portable, when we hit ungrams can be cheaper than expected bugs on the recently writing one of them? That is the experience of a large So, in fact, what I am talking number of those who have

about is making conscious use tried. And even when it has not of the concept of spare part been cheaper, there are reports programs when planning a of "only 10 per cent more." new system. The most The reason is that dual but immediate objection is cost. distinct software can be used However, before you discard in a variety of ways to reduce the idea on cost grounds, ask the total cost of software proyourself whether the dual duction and maintenance, so computer system you have that the effort of coding it twice coding being only five to ation to one of the CPUs when 10 per cent of a real time prothe other fails), is really well ject anyway, may be a profitplanned. Half the breakdown able investment. causes are hardware, but half One example is the kind of

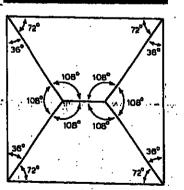
computer, even a doubling of

of them are from software, in- thing that Rault of Thomsoncluding user written programs. CSF in Parls has practised. He Is it really consistent codes electronic design proeconomics to buy hardware grams in APL, as a cheap spares and not to buy software model (one-tenth the cost of spares? The myth that pro- Fortran) and then recodes, grams don't break down, "once from the model as a plan, in they are right," and therefore Fortran, to get a program with need no spare parts, is difficult one-tenth of the operational to break down, because the cost. people who believe it have not been listening to the wide-In order to test the system he

feeds the same inputs into both Write two programs to per- spread experiences in the soft- models and checks to see if form the same function. One ware field which tell their they produce the same outputs. This amounts to auto-Software is as error-prone as mating the desk checking and hardware. There is no known automating manual validation way of guaranteeing error-free of test cases. software which is practical,

repair of software faults, using correctly updated along with

If you are planning on thorand in any case a spare part is ough testing, like all test paths much cheaper than a perfect this results in a considerable program. Two Volksvagens saving of human time, which are probably a more reliable more than pays for the APL transport alternative than one model. The APL model was For some real time online replaced flowcharts and noninstallations, particularly the machine readable pseudoones which feel they can afford code. Also it can be used during to have a mostly idle standby maintenance phases both as documentation and as comverify that your flowcharts are



the plan view of a roof for a cubic building. The angles show the actual shape of the roof faces, the centre ridge being higher than the eaves. After watching the roof put up, the architect had a strange dream.

Similar roofs were being erected on each face of the building sideways roofs on the walls and an inverted roof beneath the floor. The com-pleted building assumed a sur-prisingly regular shape. What shape was it?

SOFTWARE FILE

More efficiency, ease of use in Mark IV update code. Firmware saves the scope for known and the last like the scope for known and last like th

incorporated in Release 7, which should be delivered to the 60olus UK users by the end of

The release increases the efficiency, ease of use, and interface capabilities of this popular system in several areas. Many users feel that these represent the greatest step forward yet in any single release of the product.

In the area of efficiency, Release 7 extends the use of compiled code routines, which are selected at execution time. This should increase the speed of the system, which is in general

mode queries and requests

Later in the new year, it

online inquiry facilities willie

available as optional extra

These features will hand

queries either through CKS o

via Informatics' own telepicts

As part of the new release.

applicability of Mark IV ha

been extended to include a

implementation under Univac

Chasing

A LEADING UK Burrouph

software house has sit up a associate company to cake a-clusively for users of the fis-oughs Sories L visible next

Computer.
The company, to be linear us Silnin Associates Ltd, will have Mike Silnin, the compute boss of Silnin Systems and a director of Law Data Systems, see challengers, satisfied Buildhoom

as chairman, with Paul Whys and Tony Bentley as joint

jeneral managars. Slinn said he was dwing

Series L market because h

the largest installed user basel the UK, Burroughs was option for disc-based development

and he could provide the spe

tise through his other co

panies for users wisky to 4 grade to 8 880.

The company will operate from Commerce House, Bad-

ford from January 1, 1978.

First UK use

THE program conversion package Necol developed by

9). has achieved its first UK sale

The software is to be used

electrical contractor N.

Bailey, of Ilkley, Yorks,

Converting from an NCR Century 75 to an NCR Crierion

Bailey will convert all its pro

grams, amounting to about 200,000 lines of Neat/3, to ANSI

1974 Cobol, using the Necci

MOORE REED & CO. LTO.

Walworth, Andover Harts Tel Andover 4166

nackage.

ACOUSTIC

COUPLERS

'omputer Facilities (CW, Jure

sing monitor, Intercomm

clude provision for the automatic sequencing of logical segments and increased control over update transactions. Facilities for the manipulation of source statements have also been improved, making it easier to retrieve Mark IV programs for modification.

Interfaces to IBM's IMS and Cincom's Total have also been enhanced, chiefly by providing for logical records greater than 32K. About a third of IMS installations worldwide also use Mark IV and some users have recently found the previous 32K limit to be restrictive. Other

Series! PROGRAMMER NOTES business

GOTOs fit the bill FOLLOWING the GOTO coding example submitted by Frank House (CW, December 1), many readers have pointed out that a structured solution to the problem as printed is trivial, using the

CASE construction of Algol 68 or Pascul. For example, Geoff Allwood of London Hospital Medical

print (input request);

while read(d) : $d \neq 0$ do

case d in (read fresh data), (read starting point), out print ("clot") esac;

However, the complete program skeleton ruises interesting questions of coding and we publish it in full as a contribution to the GOTO controversy (Fig. 1).

House makes the following observations on the program: • The main routine is traversed once, without any choice of route, before the user is offered the choice for subsequent tries. This could be accommodated in a structured program, but at the cost of defining an extra variable to keep track of whether the current pass is the first.

 The labelled statements are successive stages in a sequential process, eg if you GOTO "start point" then the statement

abelled "carry on" must be subsequently executed.

The label "fresh data" is in a block global to that containing the other labels. GOTO can skip out of the current block into a global block, and I think that this is a reasonable thing to do on some occasions, and should not be banned in the interests of

Programmer Notes invites comment on the apparent economy and legibility of this solution. Does it depend on the size of the procedures? What advantages would a structured design confer?

FIGURE 1

begin integer number of observations; fresh data: number of observations := read; begin array t. c [1: number of observations] . . . :

start point: comment statements to read starting point; carry on: comment fit function from current best estimate and print results:

iput new data 2 to input new starting point, 3 to resume. 0 to stop');

d:= read:

if d=1 then goto fresh data; if d=2 then goto start point; fd=3 then goto carry on;

if d + 0 then begin print ('clot'); goto try again

MPG

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hardware functions in Honeyarise from the division of all prowell's medium-scale Level 64 grams into data segments and machines has led to more efficient and economical use of

The extensive use of firmware in the Level 64 means that new Gcos 64 releases often include replacement circuit boards. However, much of the firmware resides in programmable ROMs and can be modified during the system generation procedures.

Designed and manufactured by CII Honeywell Bull in France, Level 64 incorporates several aspects of larger Honeywell systems, including features of Mul-

One notable feature of the system is the distribution of processing power. Each group of peripherals has its own service processor capable of running channel programs and controlling several devices.

The disc service processor, for example, consists of eight microprocessors, which can all work simultaneously on central processor requests.

Execution is speeded in other areas by hardware implementation of crucial software features. The dispatcher, for example, which schedules and controls the execution of software processes, is a hardware

For each process, a process control block is built in memory which defines to the hardware such essential parameters as the task priority, register usage, and status information.

Hardware "semaphores" are used for communication between co-operating processes, such as asynchronously executing programs which must at some point exchange data. A semaphore set by a "producer" process will automatically wake the "consumer" task.

The use of hardware semaphores to control and synchronise communication in the Gcos 64 operating system aids efficiency as well as conributing to a clean software

pure code segments. Because all routines are re-entrant, the processor never holds more than one copy of a particular routine. Sharing of code in this way greatly facilitates the implementation of full database and teleprocessing facilities on Level

Logical segmentation also provides an optimum basis for virtual memory. Code segments are never rewritten to backing store and swapping is further reduced by allocating residency status according to frequency of use. In order to minimise protection attribute will be thrashing, compilers generate

rejected by the hardware. Have your say on BS Coral 66, RTL/2 specs

WORK to standardise the de-finitions of Coral 66 and RTL/2

At a meeting last has now started at the British Standards Institute. The committee on programming languages, DPS/13, is inviting comments from all interested users.

The standard for Coral is likely to be based on the existing HMSO publication, Official Definition of Coral 66, with modifications being restricted to editorial changes. However, consideration of RTL/2 is rep-

orted to be still at an early stage. The BSI regards both languages as well established and sees no point in raising again the question of which is the better language. By studying both simultaneously, DPS/13 hones

secretary of DPS/13, A.M. Conybeare, BSI, 101 Pentonville to avoid giving the impression that either one is receiving pre-First NCC grant repaid

loan under the Software Products Scheme administered by

THE first full repayment of a loan under the Software Pro-

the control of user instructions.

Implementation of Multica-

type protection and security

features was a major design aim

for Level 64. Four "rings" of

protection are provided ranging from level 0 for the supervisor

nucleus, to level 3 for least

the processor according to its nature rather than its physical

location. The system provides

individual protection for each

segment using read, execute,

and update flags — the "pro-

tection attributes" of the seg-

ment. Any attempt to violate a

At a meeting last month in

The Hague, the International

Standards Organisation sub-

broad agreement to leave de-

finition of the Coral standard to

the UK. It seems therefore

probable that the UK standard

will also become the internatio-

Those interested in con-

tributing to the project should

apply to the BSI for copies of the

proposals. At this stage, the

committee is requesting com-

ment on the changes it intends

to make.

Details of the changes proposed may be obtained from the

nal standard.

Information is protected in

trusted user programs.

the National Computing Centre has been completed by the Oxford firm Telecomputing.
The NCC funds were used to

monitor, which now has more than 70 users worldwide. The success of the product was recently demonstrated by ICL's decision to adopt it for marketing in the UK, following earlier agreements on sales in the rest of the world (CW, October

elecomputing is to continue to market the package itself, having made 10 UK sales in the

The company recently opened a branch office in Amsterdam at Herengracht 89A, Amsterdam 1001, Holland.

Consultancy switch pays with sales up 33% ingram hoped to concentrate

A CHANGE in direction to consultancy work was the major factor behind the 33% increase in on the growing market for turnover recorded by the Coventry-based software house, Systems Resources.

Managing director Paul Ingram said that historically his irm had been mainly concerned with project work. But an increasing demand for consulta-tions had helped take the turnover from £160,000 to just under £240,000.

CISI moves into W. Germany

EXTENDING its international Starbrucken.

bureau connections into West. This is CISI's first acquisition bureau connections into West. This is CISI's first acquisition of the International in the German market. LKS Germany CISI, the computer in the German market. LKS services arm of the French Honeywell mainframes will be atomic energy authority, has used to provide a scientific and acquired a controlling interest in sectionally oriented bureau services parents. Service bureau sof vice

New year springboard for Software Sciences

A RATIONALISATION of its varied but often inter-related sales and technical organisation has been carried out by Software Sciences Ltd over the last few months as a springboard for an attack on new markets and overseas sales in the new year.

The sales force of Software Sciences Inca, Products and Turnkey subsidiaries have been brought together under Pat Whale, but with some redundancies. It will be supported by the technical group with experts dedicated to particular products and services.

According to Software Sciences marketing director Tom Ulrich, the new structure will help to provide a "more co-ordinated approach overseas and will assist in providing them with better feedback in the development and selling of its

The kinds of areas into which Software Sciences will be moving more aggressively next year was highlighted last week by its development of an RTL/2 compiler - the first for a micro - for the Texas Instruments 990/10 micro due to be completed in early 1978.

Earlier this year, Software Sciences took over Comet Computer Services which manufactures micro-based systems. And Software Sciences' TI 990-based SEED system for developing microprocessor software together with the RTL/2 compiler gives the firm the capability to develop microbased packages and services in

Review of program testing techniques

PHILOSOPHY and techniques of program testing were reviewed this week at a threeday Infotech seminar in London. The seminar was presented by Dr Edward Miller of Software

Subsequently, he joined Stephen Howe (Consultants) where he has worked for the Dr Miller pointed out that software reliability has been of last four-and-e-half years on real prime concern in aerospace and ima and online systems. military contexts. The relative at all project stages from requirement and feasibility studies to systems implemen-

CW's new

software

AFTER four years as editor of Computer Weekly's Software File, Stephen Bell has left to work in New Zealand. From the week Peter Hewitt, 29, Will Lin charge of Software File after

seven years' experience li systems analysis and program

"On leaving university, he

worked as a programmer for Cambridge Data Processing and

wrote in Cobol and Assemble for IBM mainframes. He als

gained experience of IMS BOMP and GPSS.

This work has involved him

with a wide range of software

Bureau's Leap

EXTENSIONS to Computer

Consortium Services' Leap en-

gineering analysis package have been implemented by SIA. They

are three new post-processors

covering dynamic analysis

forces and a stress evaluation

outlnes for plotting deflection

In addition, processing

capacity has been increased in

the bridge design subsystem.

gineering analysis program,

minicomputers — particularly first time users — during next year and pointed to his firm's experience with Digital

Other plans for the 30-strong

firm included the completion of

an internal re-organisation

almed at steering more

side and emphasis on IBM main-frame and small system users.

resources to the consultancy

Equipment minis.

Vehicle, and the marine en-

extensions

lack of progress in program proving, despite substantial funding in recent years, had lent greater emphasis to the devement of program testing. and hardware, especially Plan, Coral, Mumps and Basic on ICL, Digital Equipment and Hewlett-Packard machines.

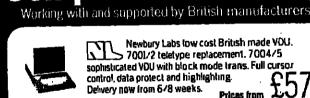
While no degree of testing can establish that all errors have been found, several measures of program testing coverage are in existence and, in some cases, their effectiveness in improving program quality has been documented quantitatively.

One problem in thus evaluating testing methodologies is the reticence of software developers to reveal how many errors have been found.

As a preventative technique Research Associates, California. one possibility is to structure the software system so that testing will be easier. For individual program segments, tools such as IFTRAN are available which will convert in either direction between programs containing special structuring constructions and standard compilable

> As an alternative to comprehensive and lengthy dynamic testing, the use of static analysers and code auditors can be a highly cost-effective method of eliminating a very large number of errors.

Computer Marketing



MSI low cost British made range of cassette data recorders. Teletype compatible. High speed (2400 B.P.S.) Standard serial interfaces

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641 London Road, West Thurrock, Essex. Tel: (04026) 3010 Telex: 896786

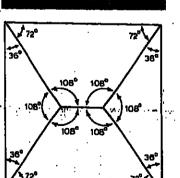


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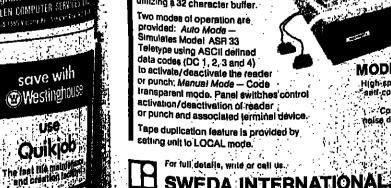
Turn to page 39 for the



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gned to operate with a terminal de STOP WASTING MONE on the same serial data lines or alone on a dedicated serial line. Reader will generate date at all slandard baud rates up to 2400 baud VicroSim 80 Punch accepts data at all standard baud rates up to 600 baud The world's most a continuous or 4800 baud batch, ullilzing a 32 character buffer. ALLEN COMPUTER SERV MODEL 1560-AS High speed, compact, with sett-contained electronics And power supply complete in attractive

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Deaklop combination reader/punch with serial

asynchronous RS-232C compatible interface.

plug-compatible reader/punch

SWEDA INTERNATIONAL, INC. Litton OEM Products

COMPUTER WEEKLY, December 15/22, 1977



Walsgrave appeal success

LESS than six months after being launched, the Walsgrave Hospital Scanner Appeal has reached its c220,000 target, and money is still coming in. The Coventry hospital now has enough money, with a £100,000 contribution from the Warwickshire Regional Health Authority, to buy the CAT scanner it needs, which will serve Coventry

Infotech courses

February 1978

Advanced Systems and Programming

Computer Systems and Installation Security 7-9 Feb London

Advanced PL/1 Programming Techniques 14-16 Feb London

Communications Techniques 27 Feb - 1 Mar London How to Organise and Control Structured Programming Teams

Tools and Techniques for the Software Development Manager

Fundamentals of Teleprocessing Systems 6-10 Feb London System Design for Teleprocessing 13-15 Feb London Data Communications Networks 13-15 Feb London

Advanced Real Time Software Workshap 27 Feb - 3 Mar London Distributed Processing Systems 21-23 Feb London

Jackson Design Methodology: Training Workshop 20 Feb - 3 Mar London

Data Communications Software 13-15 Feb London

How to Improve Systems Development Productivity 20-22 Feb London

Project Management - Level I 6-10 Feb London Project Management - Level II 13-17 Feb London Project Management - Level III 1-3 Feb London

Real Time/Data Communications

15-17 Feb London

Structured Design

and the county of Warwickshire.

Money has poured in from every possible source, jumble sales held by kids in parents' garages, pensioners' savings, gifts from small and large companies, specially organised dances, funny football matches,

computer to process X-ray data and produce a cross-sectional image greatly superior to that obtained by conventional X-ray methods (CW October 20), is now considered a necessity in a well-equipped hos-pital. But health authorities budgets do not often run to £320,000 for one machine, however sophisticated, and the money usually has to be

For example, the Royal Marsden Hospital in Surrey has recently acquired an EMI scanner which will be used both for cancer research and for diagnosis. Although the scanner was paid for by the Cancer Research Campaign, the amount made a sizeable bite into the Campaign's budget for the year (and in fact an appeal has been loveded in the second seco has been launched in the computer industry to take some of the strain by raising the cost of the scanner's

computer, see below).

The Walsgrave Appeal was launched by Bill Whatmore, a surgeon at the hospital, and Mike Cotton, a chartered surveyor of

It was given extensive coverage by the Coventry Evening Telegraph, and then it really took off. Children in the summer holidays, workers in factories, hospital patients, church congregations, all vied with each other in organising events. The money started to roll in fast, and by autumn the take was averaging

£7,000 a week. Coventry City FC gave the players' fines, Massey-Ferguson gave £20,000, Chrysler gave a car, a retired miner gave £250 "from a tin box," and the Leamington Lions gave £1,000 from their annual sponsored pub-grayal. These correlates sored pub-crawl. Three organists gave a concert. Arnold Lodge School, Leamington gave £500 from

And no-one can say they don't

 Details of Walsgrave Scanner Appeal events can be obtained by phoning the Scanner Office on the

I'll. fole of online computer systems in purchasing and supply will be examined during a one-day conference organised by the Computer Specialist Section of the Institute of Purchasing and Supply. The eyent will be held at the Europa Hotel, London Wi, on January 26. Further information from Mrs C. Moulang, IPS, York House, Westminster Bridge Road, London SEI 7UT. Tel: 01-928 1851.

THE use of PABX exchanges and the

THE use of PABX exchanges and the application of new technicacy to private switching systems will be discussed at a conference entitled Private Electronic Switching Systems scheduled, for April 10-12, 1978. The conference is organised by the institution of Electrical Engineers and will be held at the IEE Headquarters. Sayoy Place. London WO2. The meeting has been timed to follow the Communications. 78. Exposition in Birmingham on April 47, Further details of both events from the IEE Conference.

Data Base Design and Administration Workshop 6-10 Feb London More events are scheduled for the

Performance Evaluation and Optimisation of On-Line Data Base Systems 13-15 Feb London "No way will the extra money be wasted," says Mike Cotton, "We shall now be going for the optional extras, so that the people of Coventry and Warwickshire can have the best machine in Europe." Data Base Integrity and Recovery Techniques 27 Feb - 1 Mar London How to Get the Best out of IMS 20-24 Feb London . Minicomputers and Microcomputers

Minicomputer Systems: Assessment and Application 14-16 Feb London Minicomputer Systems: Evaluation and Selection 21-23 Feb London Minicomputers for Commercial Real Time 28 Feb - 2 Mar London Microprocessors: Assessment and Application 28 Feb - 2 Mar London

IBM DOS and DOS/VS Basic Operations Techniques 7-9 Feb London Data Control Techniques 21-23 Feb London Tape Library Control Techniques 28 Feb - 1 Mar London IBM DOS and DOS/VS Advanced Operations Techniques

hospital's number, 0203 613232. Those interested in contributing to the Royal Marsden Appeal should IBM OS and OS/VS Advanced Operations Techniques 7-9 Feb London contact David Ayers at Tritech the Cancer Research Campaign at 2 ICL 1900 Advanced Operations Techniques Operations Team Control and Carlton House Terrace, London

Supervision - Level I 6-10 Feb London Operations Team Control and Supervision - Level II 21-23 Feb London Operations Management and Control Techniques 20-22 Feb London On-Line Operations Management and Control Techniques

23-24 Feb London

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and rrogramming Management Development Real Time/ Data Communications			☐ Data Base ☐ Minicomputers and Microcomputers ☐ Operations				
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INFOTECH





Univac man moves to US

UNIVAC director Ted Jones has director of public relations. He will be based at the Univac Worldwide Communications Department in Blue Bell, Pennsylvania.

Jones, a chartered accountant by

profession, joined the company in 1984 and has held several manage-ment positions with Univac, in-cluding that of director of mark-eting, UK.

Rene Berger, formerly director of Honeywell's South-West and Scot-land region, has been appointed director of the DP division, and Jim Duncan, ex-Northern region director, becomes director of the general systems division.

The former Southern region

director of Southern region and central government within the DP division. Fred Snow, who was director of the former field sales division, is transferring to Honeywell's US Information Systems Group as director of marketing.

Derek Slade, a senior consultant with the P-E Consulting Group, has joined the board of Park Business Systems, a subsidiary of P-E International, and will be responsible for the marketing and support of the

Fred Ainsley joins Scicon as sales consultant specialising in automation systems. He was formerly manager of Westinghouse's sales group for computer-based telemetry

Scient is joined by Rob Clubb, former senior design and develop-ment engineer with Allied Business Systems, as a technical consultant, and Barrie Brinkman, previously project leader in the Post Office's telecomms development de-partment, as a consultant.

Roger Parsons, until lately sales manager for the London region with Prime Computer UK, has been

Miniconference on miniconputers for information retrieval. BCS information Retrieval Group/Aslib Informatics Group on Minicomputers for information Retrieval. University of Manchester Institute for Science and Technology.

Manchester 1100.

toms, colloquium, institute of Electrical Engineers, IEE, Savoy Place, London WC2, 10,30, Register with IEE,

A systems approach to pictorial pattern recognition — lecture series. Morton Nadler. Machine intelligence Research Unit. Chesa Lab. MIRU, University of Ediphyreb. 10 30.

Computerised tomographical scanning, lecture. Institution of Electrical Engineers. IEE, Savoy Place, London WC2. 5.00 for 5.30.

impact of minicomputers in deve-

loping countries. Dr. Y. Packer, BCS Developing Countries Group. Zeus Hermes, Capper Street, London WC1. 18,00.

Management matters. Rt Hon Sir Ha-rold Wilson. BCS, Merseyside branch. Adelphi Hotel, Liverpool, 18,00, JANUARY 9

Holography enters the microfilm world.
Peter Waterworth, BCS Microform
Group, NCR Ltd, 206 Marylebone Road,
London NWI, 16.30.

Reading branch. Venue to be announced.

teda.
Why is bureau is the best solution for a litest time, user: 1805; First, Time, User: Group, Royal Angus Hotel, Bireshagilant

INUARY 10

DANY

DECEMBER 19



Richard Gill and Clive Owen have joined Systems Resources, the Coventry-based software house, as consultants, Gill, who is an IBM TP specialist, came from Bakelite Xylonite where he was a senior programmer, while Owen was previously a consultant at Altergo

Gordon Young, computer officer at Liverpool University has been romoted to section manager, oftware, in the computer lab. Roderick Cook has been appointed a demonstrator in computational and

Randolph Madoo has joined L.P. Sharp as an API, consultant, He recently obtained his BA degree in computing science and statistics from University College, London.

Frank Chabre becomes personnel ector with Rockwell International's electronic systems group in Dallas, Texas, Previously he held the same position with the company's Collins commercial telecomms

Peter Breeze, formerly a senior tems engineer with Cincom, has been promoted to UK technical support manager.

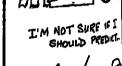
Ray Guinan of Cara Data Proces sing, until recently sales manager, has been appointed regional in-

John Shufflebottom, assistant systems design manager for Greater Manchester Transport, has been romoted to data centre manager.

International telex switching systems. C. C. Harman, E. E. Daniels Institution of Electrical Engineera, I.E., Savoy Place, London WC2, 17,00 for 17,40. What this IPM thinks of the independent computer specialist Gerry Fisher, Association of Independent Computer Somebilists. ACC 2015.

Specialists, AICS, 8 Locester Street London WC2 18.30.

JANUARY II



London WC2, 18,30,
Visit to Young's Brewery and computer installation, BCS, Kingston upon Thannes branch, Regional Management Centre, 4ll Cuombe, Road, New Mulden, 17,00, Numbers limited, Operating systems, Geoff Newell, BCS, North London branch, West Lodge Park Hotel, Cockfooters, Middx, 19,45, Data input without a keyboard, John Gore, Roy Thomas, BCS, South Essex branch, The Bull's Eye, Basildon, 19,45, Microprocessors, P. Crowe, BCS, Bristol branch, St. Vincent Rocks Hotel, Bristol, 19,15. Bristol, 19.15.
Stock control, Dr M. J. Walsh, BCS. Beifast branch. Windsor Hotel, Beifast. 19.30. Experience with a commercial latabase: G. Anderson, BCS, Edinburg branch, Mountbatten Bidg, Heriot Watt University, Edinburgh, 17.30.

JANUARY 12-13 Programming group meeting. IBM Computer Users' Association. Washington Hotel, London.

Integrated circuits — reliability, collo-quium. Institution of Electrical Engineers, IEE, Savoy Place, London WC2, 13.30. Register with IEE. Computer staff recruitment and remuneration. R. Campfield. BCS, Bedford branch. Crest Motel, Luton, 19.30. JANUARY 17 Effects on society of technological change, Barrie Sherman, Association for Computing Machinery, Polytechnic of Central London, London W1, 19.15. 19.30. Suffolk Police command and control system. Chief Supt W. Hagger. BCS, East Anglia branch. Anchor Hotel, Thetford. 19.00. JANUÁRY 18

JANUARY 18
Data communications, a personal view.
John McNulty. Data Processing Management Association. CDI, 7? Wells Street, London W1. 18.00.
The potential of digital processors in radio communication systems, collegulum. Institution of Electrical Engineers IEE, Savoy Place, London WC2. 10.30. Register with IEE.
Computers and the blind. Prof J. L., Douce. BCS, North Staffs branch. North Staffs Medical Institute, Newcastle-under-Lyme. 20.00.

Viewdata, the personal computer of the future. Sam Fedida. BCS, Croydon branch. Fairfield Halls, Croydon. 18.18.
Weather forecasting with the Cray machine. Dr. Rob Brinkhuyson, BCS.
Reading branch Vanue to the consumer.

Practical Honsywell computing.
Speakers from Honsywell Information:
Systems. Data Processing Management
Association. Bull Hotel. Gerrards Cross, JANUARY 18-19 Computer Users Association, County Hall, Chester. JANUARY IS



Introduction to Science

SCIENCE can be as exciting and romantic as fantasy — this bit control idea of a series of plan for children aged 7-11 from by Molacule Club, an offshort of London's Mermald Thairs.

The latest of the plays, Poly Apart, is the story of two clay ren's escape from a volcar eruption, during which the eruption, during which the learn some basic fact star magnetism and electricity Poles Apart will be seen to be Poles Apart will be on touriste South of England and Well

thia spring.
For further details phose
Suzenne Skupinski at the Ms
maid, 01-236 9521.

Schools quiz on computing

SIXTEEN Merseyside schools have entered for an interschool quiz on computing organised by the BCS Merseyside branch in Computer Education Group.

The four rounds will take pixe in January, February, Marchael

Recruitment firm branches out

THE controlling company of SR Specialist Computer Recruits: a branching out into the secret:

Peter Rigby and Associate to acquired three secretarial agent Angela Chapman Personnel is Liverpood, Clive Court Employer Agency in Birmingham and Ob-Girls Employment Office in the Comational chain.

The group aims to start a general Sernior executive recruitment com-pany, based in Landon's West Enduring the first quarter of 1978.



TIVE ASKED CHRIS MERLIN FOR A FUTUREVIEW OF THE COMING YEAR.











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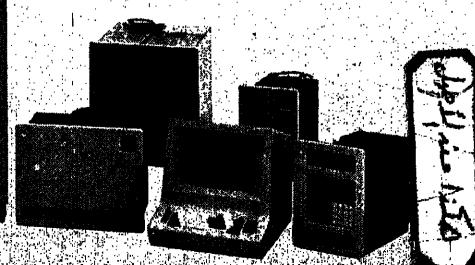
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and working.

If you'd like further details of IBM's Series/1 systems (prices start from around £7,500), call Rick Ackland Snow at: IBM United Kingdom Limited, General Systems Division, London Wall Branch, 40 Basinghall Street, London EC2. Tel: 01-628 7700, ext. 2661.







MICRO NEWS

Edited by Martin Banks

Single chip system trendsetter of year

can be said to have any significance, the most interesting developments of the past year have occurred in the single chip "system" area. To be sure, some of the hardware will not be avallable until next year, but recent announcements from Intel, Zilog and Motorola have all pointed to the route that the micro manufacturers are planning to follow.

To a large extent, the significance of the announcement of the Intel 8021, the Zilog Z-8 and Motorola 6801 lies not in the products themselves, but in what they represent as a technological trend. All are being aimed at applications where a relatively small amount of memory coupled with some I/O capability can be employed with the minimum of extraneous design activity on the part of the user. One chip and just a few additional components can be engineered into a working system with a minimum of exper-

The applications themselves. certainly in computing terms, do not yet represent a dynamic advance, coming as they do in the form of process control opera-tions and slightly less than mor-onic terminals. But as a level of **NS** data capture system

CLAIMED to be the first single

chip data acquisition system, the

National Semiconductor

ADCO816 can be used to replace

up to £100 worth of analogue to

digital conversion equipment in

8-bit analogue to digital con-

verter with Trl-State latched

outputs, a 16-channel expandable multiplexer with address

FOLLOWING the decision of

Rockwell to manufacture the

6500 family of microprocessors

designed by MOS Technology its UK distributor, Pelco Elec-

tronics has instituted a series of

three-day courses covering the basic theory and hardware of

The main aim of the course

will be to initiate participants

into the practical use of the main

6500 family design aids, the

One course will be run each

month during 1978, with a

maximum of six engineers per

KIM-1 and System 65.

Included on the chip are an

a variety of applications.

ducts, and with a price reduction of traditional semiconductor proportions, they represent a significant step down the road towards the real single chip computer system. The introduction of these pro-

ducts must also be considered in relation to the other major developments from these three companies, the Intel 8086, Zilog Z-8000 and the Motorola MACS. All are 16-bit processors with a computing power that will be equivalent to systems from the Digital Equipment PDP-11 range. They represent the semiconductor companies' continued push for greater integration and computing power. They will be expensive and require considerable initial expertise in their implementation. They will, however, follow and extend the pattern now being set

Perhaps the other most significant event of the past year has occurred in the related area of semiconductor memory devices. The manufacturers, dominated as they are by the requirement of maintaining high volume production, have established a long tradition of price attrition as a means of expanding the available market for a

input latches and provision for

handling external signal con-

Further information can be

obtained from Pelco at Enter-prise House, 83/85 Western Road, Hove, Sussex BN 3 1JB.

Memories stocked

OFF the shelf delivery of intel

add-on memory systems for Digital Equipment LSI-11 com-

puters can now be obtained from

Typical of the systems to be stocked is the In-1611, which is

said to offer better performance

than its DEC counterpart for

less money and in less space.

Rapid Recall.

by the 8021, Z-8 and 6801.

very day. The volume of orders for the part has, however, far exceeded the rate at which the part can be produced. It will now be some time before orders are fulfilled and the price becomes "right". Finally, on a different tack

empted the manufacturer's rate

of price cuts, and orders flooded

in based on the premise that the

price would be right come deli-

from the industry proper, Lynx Electronics made the potentially significant discovery that a UK hobby computer market may exist after all. At its Wembley seminar, it sold 96 Nascom computer kits, bringing the total sold to over 300 (CW, December 8). Virtually all were bought sight unseen, even though the price tag is about £200. Who said the British were a cautious race?

Cosmac VIP Computer kit ANOTHER company about to enter the UK hobby computer market is RCA Solid State with

market is RCA Solid State with its Cosmac VIP computer kit. Based on the company's CMOS-manufactured CD 1802 processor, the kits are currently being modified to work directly with PAL standard televisions. Priced in the US at \$275, the kit concists of a single printed circuit card on which are mounted 2k bytes of RAM, 512 bytes of ROM, a hexadecimal keyboard. 100 byte per second

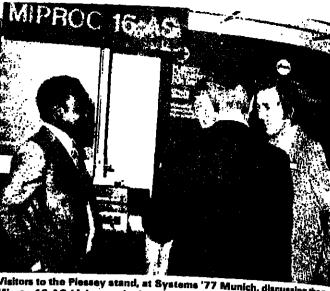
keyboard, 100 byte per secont cassette interface and power

supply.

The ROM is utilised to hold the operating system, which provides such facilities as direct interfacing with a TV, simplified loading of RAM, data transfer from RAM to cassette and single-teachers.

aingle stepping of programs.

Easy expandability has been made a prime feature of the kit, and an expansion board is available that can accommodate up to 32K bytes of additional RAM, plus a further 19 input/output lines.



Visitors to the Plessey stand, at Systems '77 Munich, discussing the new Miproc 16-AS high speed microcomputer system with Alan Senior (far right), Microsystems sales manager in Germany.

THE Plessey Miproc 16-AS stainless steel tubing. The tubing has to be tested for later

microcomputer system, which made its public debut in Germany at Systems 77, has found a ready market with Krautkramer GmbH, a Cologne-based manufacturer of ultrasonic nondestructive testing equipment.

Six systems have been sold to the company, where they will be used as high speed controllers in automatic test equipment used in the production of high grade

tubing has to be tested for internal and external diameters, plus wall thickness, and the testing has to take place while the tube is rotating at 2000 rpm and being fed through the tester at one metre per second.

Plessey has also sold nine systems to Quaye DV, a specialist systems house located in Kaarst near Dusseldorf. These will be used in process control.

OP SPOT

TO carry out his function effectively, an operations-manager needs to be familiar with many subjects. He plays the role of a psychologist when dealing with personnel or economist when considering his DP budget for the coming year; and must be able to communicate with programmers and engineers regarding tech-nical matters. Add to all this the fact that he must be aware of the problems of users and it

Housed in a 40-pin package, the device can perform a conbecomes clear that his task is version in 50 microseconds, and varied and complicated. is particularly suited to medical Firstly the DP budget coninstruments, process control, incerns capital expenditure such dustrial control and machine control. In quantities of 100, the peripherals, core storage, device is priced at £12.95. **Courses on Rockwell 6500** operations manager should often. have an up-to-date knowledge of the equipment available, the The fee will be £85 per person. relative costs and its worth to

his installation. Secondly, it involves staff salaries and the manner in which they are calculated. Here he is restricted by the manner in which the company awards pay rises, by govern-ment legislation, and possibly by the trade union to which his

operators belong. Ideally, increments should be related directly to the true value of each operator in the installation. They should be

The manager—man dealing with personnel or recruiting new staff; that of an economist when considering

months and the operations manager should consult the shift-leaders when putting his views to the DPM.

In this context, each operator should be told how well, or badly, he is doing.

If the respect of his staff is vital to an operations manager then he should try to gain it. In this matter it is important that as the purchase of new he does not become a mouthpiece of his DPM's views -VDUs and ancillary equipment. In this regard the socialise with his staff too

After defining installation procedures and regulations, he must ensure that his directives are followed fully by the operators and must support his staff, should disputes with related departments occur.

At many installations it is a rule that only operators, engineers and systems programmers, when requiring "hands-on" time, are allowed to enter the computer room. It is important that the operations manager does not alter this

rule under any circumstances. This is particularly annoying linked to staff appraisals and disheartening for the contaking place every three or six sole operator who has taken the time and trouble to plan the order of his workload. Such planning usually involves the setting-up of job queues and

While his foremost consideration must be the service accorded to users, he must not allow them to dictate either to himself or to his staff. For example, if a member of pay-roll staff has to wait for his output longer than usual due to a printer being out of service, the operations manager should inform the person of the cause of the delay and not allow the work schedule to be disrupted, except in extreme

the mounting of discs.

Although remaining de tached to a certain extent in socialising with staff, he must be able to communicate with them on all matters regarding work. This balance between detachment and communication is difficult to achieve and maintain, but is important.

circumstances

A good opportunity to relate to personnel occurs at staff meetings, but these are often restricted to senior operators, shift-leaders and the opera-

get a much broader view of the a greater awareness of the problems to be overcome. Such a scheme leads to more interest on behalf of the staff, because apathy can arise when operators lack encourage-

When talking to operators and discussing their abilities and shortcomings with shiftlenders, it is essential that the manager gets an accurate assessment which will help him to ensure that each shift

recruitment of staff, and the

The operations manager has a great deal of responsibility to

By Bernard Allen

tions manager. An excellent idea is to allow a different member of each shift to attend the meeting on each occasion, whether they be a senior operator, operator or trainee. This enables all staff to

running of the installation, and

The manager must be able to accept constructive criticism from his staff and in the appropriate situation, actupon Operators regularly have good ideas about the manner in which the computer rooms organised and run, but are rurely given encouragement.

has a balanced staff.
Closely akin to this is the

operations manager must be able to assess a candidate and consider if he will fit into the installation.

his company, his staff, and above all to himself.

6% THINK GOOD PAY 52% SAY THAT 61% WOULD LIKE BUT 100% SAY THAT FOR THE IS MORE IMPORTANT GOOD PROSPECTS A JOB WHERE JOB THAT HAS EVERYTHING THAN JOB SATISFACTION COME FIRST MORE USE IS ONE MUST GO TO MADE OF THEIR TRIDENT. EXPERIENCE . The Contract and Permanent Placement Specialists

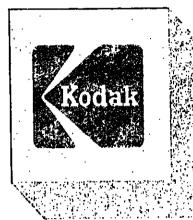
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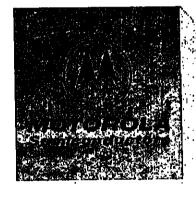


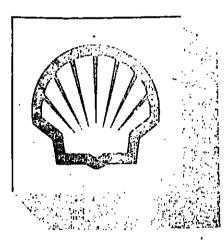












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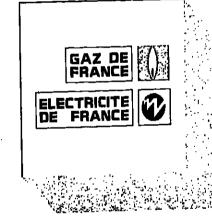
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DOWNIME CHRISTMAS SPECIAL

AT exactly 23.57 hours East African Time, Martin Hillman ctilious, exact. He wanted things

the guerrilla warfare being waged by President Patani, selfappointed dictator of the neighwas hard to take this micro-Hitler seriously.

In Rempana there had just been one of President Patani's magnificent air raids. His entire air force, which consisted of 11 Crusaders, had scattered incendiarles in all the wrong places. Most of them fell in the river, thus creating a thrilling firework display much admired by the populace. Of the two buildings hit, one was the US Embassy. The Americans had provided Patani with the Crusaders, "The world is mad," said the operator coming off shift.
Martin said, "The CIA don't

do their homework in time. It took them two years to realise that Patani was treated for pa-rancia in one of Michigan's more Juxurious psychiatric homes before they finally went sour on him. I think I can smell the American Ambassador's dinner T-bone steak, very overdone. Everything in order, up here?"

"Yes, Mr Hillman, Biggest program running is the census. It's all on file now and we're just running the final check on the S to Zs. But it's virtually in the

"Anything on the printer

"Only a few rude remarks

'alphabetical order'

from the validation software asking us if we've forgotten

means."
"I agree with the software; we

should have got it together by

"Anyway, we've got it all in the machine."

Martin said, "Then let's get it

all out." He signed over from the

retiring supervisor. "And please

take your coke cans with you,"

he added - then sighed resign-

edly as Wilbur, the American,

strolled in from the data prepa-

ration room. Wilbur, who

thought himself funny, was a six

foot bore with quizzical eyes,

sketched in hair and a disast-

rously ill-conceived approach to

women. "Evening, Martin, San-

derson wants to have a little

floppies for the census must be

shredded, together with any

"Noted. Wilbur, all input

chat with you in his office."

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African Time, Martin Hillman pulled on to the car park at Rempana City Centre. It was a busy place even at this time of night. Cars were parked in all the wrong bays. This always annoved Martin He was pure. to be orderly. He did his own thing in an orderly way — he was the best shift supervisor at the Computer Centre — so why couldn't other people?

The stock excuse for this irritating degree of disorder was appointed dictator of the neighbouring state. Patani ate like an updated Farouk, drank like Nero

By Christopher Hodder-Williams

> breakfast cereal factory." A tedious grin went with this.

"Incinerate them right now." "That's done."

"Good. Why is Sanderson here so late?" Sanderson was data processing manager. Normally he observed only office

"You'd better ask him. His condition is interesting. If he were human, I'd say he was in a distinctly neurotic state. But automated devices like Sanderson do not suffer from neurosis, so it must be something else. He is merely overheated. So just take a cooling fan and you'll find all his LSIs go back to normal." "Maybe he's been the victim of too many of your jokes,

"He's not coming over funny." "That's what I meant."

"SHUT the door, Martin." Sanderson looked grim. Also frightened. There was certainly nothing mechanical about him but then Wilbur's attempts at wit usually gave away more Wilbur hadn't got a girl - an

Rempana which, according to

the travel brochures, was

"Exotic, erotic Rempana, where

beautiful girls were more plenti-ful on the beach than the

pebbles". Wilbur only found the pebbles, and unkind colleagues

proclaimed that if he suddenly

turn her instantly to stone.

did find a girl among them he'd

abusing our communications

'Martin, someone's been

unfashionable state of affairs in

be bought in any local duka." as a black market in nukes?"

Martin wondered, once again, about the structure of Ngara's garage. The conversation about go on shift.

"How? They can't open up the system without a badge Sanderson got up arthritically

and hobbled over to a wall diagram. "The installation at Jennah.'

Martin said flatly, "That means Patani's men have got into the Intelligence Post. But how the hell —"

"A badge number is not a great deal of use if the operator's got a gun in his back."

vanguard been using the remote Wilbur said, "They already terminal?

Sanderson limped back to his such a good job with the are. I've sent them off to the chair. "Long enough to get what government, life was delectable.

EUROPEAN

COMPUTING

REVIEW 1978

London 20 - 24 February

they wanted."

Martin said, "I don't see what you're so shot-up about. There's no online software here except for basic file interrogation. Patani isn't going to amuse himself with a population census.

"Too right . . . Anyway, I've done the classic thing of locking the stable door after the horse has bolted. Cut the line." "I still don't see —"

"They've gone clean through here by using RJE to Nairobi. There is a classified package there called TAKNUKE." Sanderson rapped out the solution to the mnemonic. "Trajectory, azimuth, kinetics for nuclear keyed enumeration' . . . If you

Martin said, "Patani's delusions of grandeur must have gone critical. How did he get the password for the package?"

Sanderson said flatly, "Does it matter? He got it." Martin said, "Considering

Patani has to go on his hands and knees for basic ammunition, why are you taking this seriously? The man's a nut. Don't think me impertinent, Sanderson, but why get the shits about the latest thing in Amins?" He stared at the emptied whisky bottle on the desk, wondering if the heat had gone to Sanderson's brain. "Tactical Nuclear Weapons can't exactly

Sanderson stared back with eves blurred from alcohol. "Are you saying there's no such thing

Which was the instant when it had taken place only a few minutes before he'd left home to

MARTIN said, "I've just seen that garage Ngara has been building. It's odd."

Erika said, "You're going to be late on shift." Her mind wasn't on Ngara's garage. She was wondering how close the border fighting was going to get. Up till now, she'd regarded it as nothing much more than an occupational hazard; if you chose to live in the uneasy political climate of East Africa you had to "How long has Patani's weigh it off against the physical Rempana, where Martin had

The place was nothing less than But now, some were saying

that the vanguard of President Patani's troops had established a sort of fifth column very close to Jennah, the little township up the road. Jennah was a suburb of Rempana itself — the capital and was where Erika did the hopping in Jennah's only duka. You bought everything there bulbs for the garden, bulbs for the lights; excellent beef from locally reared stock; kerosene and butter, which often savoured of each other; toys for Cindy, who broke them; mosquito nets and envelopes; jeans for Erika who looked good in them even when-as now -she was two months pregnant; KD shorts for Martin, whom they

A hail of mortar bombs went off between Jennah and the valley, sending showers of sparks overhead until they seemed to mingle with the stars. Martin said, "I'm never late on

"In that case you've got time to change out of those awful shorts. They're baggy on you. Put on some weight, darling, or chuck them out.'

"Who the hell puts on weight in this heat?" "Who the hell wears shorts?

Ngara doesn't." "Ngara is black," Martin said. "So what?" She examined. with disapproval, the fit of Martin's KD shorts. "If you had a bottom like Ngara's."

"Mine isn't going to look like Ngara's just by stuffing myself with potatoes. He was born with it. So don't get kinky – and where on earth are the car keys?" He checked the stuff in his briefcase. They weren't

"I'm no more and no less interested in Ngara - or his oottom — than you are in his girl, Martin."

"It wasn't Katine I made prognant, it was you. Where are my

She picked them up off the dresser and jingled them at him. "You keep your mind off Katine and on those computers. Anyway, what's wrong with Ngara's garage?"

"I personally wouldn't have used nine feet of cond He crunched the gravel out to

to Martin and Erika Hillman's but -" place, stood a few hundred meitres to the south, toward the main road and the lake. A few lights shone there. Soon they'd be out; Katine, black and provocative, was attractive in the opposite sense from Erika, Erika was rounded and yielding at the touch; Ngara's girl was stream-lined and taut. It was true, Mar-He'd climbed out grinning, his KDs looking more forlorn than ever He said, "Shoving me in the water won" the water won" the water won the water water won the water won the water won the water the water won't stop you looking a million dollars!

"She may need all her nursing experience for your benefit, if Ngara catches you kissing me again. But you do look funny when you're drenched. Go and explain to Erika how you got drenched. You shall now buy

her a present. You are a guilty

Martin inserted the keys in the ignition but he didn't start the engine for a moment. He felt

are well within tactical missile range, as you know. More than that I cannot say. In Rempana uneasy about many things. Was you can be shot for leaking less

it really wise to leave Erika alone in the bungatow if Patani's snipers were so close? He'd put the question to Ngara two days ago. Ngara's answer had been ambivalent, "Civil Defence seem to have faith in me, so why don't

Martin had glanced at the garage. "Civil Defence and nine feet of concrete? You know President Patani has nothing that could penetrate that." It was a standing joke that Patani had managed to get all the big guns he wanted out of the Russians but had omitted to think of the ammunition they needed. By the time the penny had dropped, the Russians had cut him out of their will. Patani had to buy ammunition, shell by shell, from

sleazy sanction-busters. Ngara had said, "Katine and I will make sure Erika and Cindy are safe. The danger to us is not Patani's threat to a township like Jennah — and he won't bother with a few assorted bungalows. He wants to park his Rolls outside Government House. It's safer for Erika here

than in Rempana," Martin had said, "He'll never get to Rempana." "That's right." Ngara beamed

at him. "He won't get to Katine, either."

"Sorry I flipped." "Rather it was you than

NOW, Sanderson seemed to slump. "Martin, you've got to believe me: we're in deadly

"Then so is everyone in Rem-"Yes, but --"

use privileged information at the expense of everyone else? Per-Ngara's house, another sonally, I think Patani is wooden bungalow very similar somewhere over the rainbow,

> "He's not." Sauderson's terrified eyes colled up at him. "Martin, doesn't your family have some influence with Pan-. African Airlines?"

> "My father was a director. He isn't now. Why?" "Hillman, I want some seats

on a plane out — fast!" tin had once made a pass at her, about? You haven't a hope, down by the lake. She'd pushed anyway — it's peak holiday sea-"What the hell are you on

iver. He said, "Shoving me in We've got to get out; You, your he water won't stop you wife, my family. Now, Tonight!" ooking a million dollars."

Katine said thoughtfully, "You think I'm ill, don't you?"

Wasn't Erika a trained to the said thoughtfully, "Mr. Sandaran the said the said."

Wasn't Erika a trained nurse. "Mr. Sanderson, this is a bit Yet S before she married you?" well-d for me. Bottle of whisky window That's right." on the desk and what the hell the sill

information than I've given you already. Use my phone Make the call. Just a small block of passengers off an outbound

"I can't even tell you what I

"Listen, Sanderson, if Patani's

got something nasty up his sleeve that I don't know about do we just beat it secretly and leave everyone else to fry?" "For Christ's sake get on to your father! He must have influence, surely? Enough to get

"He might have. But _"

government of this country has

recently taken aerial shots in the

Jennah area and they know

there are microwave dishes

where there shouldn't be mi-

crowave dishes and a hell of a lot

of unindentified stuff that

Patani's guerrillas have moved

in." He tried to wipe sweat from

his brow but his shirt was al-

of unexplained activity and we

There is also one hell of a lot

ready saturated.

"But you listen to me. The

plane — that's all I'm asking." Martin spoke contemptuously. "If that's the way you feel, you'd better use the phone right now and get a directive from the British Embassy concerning the safety of British

"They'll say there's insufficient proof for emergency ac-

"Then they're probably right." Sanderson leapt up. "Are you Roing to use that phone, or not?" "Only to get you a box of tranquillisers."

Sanderson said through dry lips, "I don't think they'll be all that effective against what Patani has managed to get hold

THE heat in the DP manager's office seemed to have dou within five minutes. For the first time Martin felt it just possible that Sanderson's fears had at least some foundation in fact. Maybe it was just possible that Patani had idoas about using some kind of TNW. What Martin couldn't stomach was the total emasculation of a senior DP man.

Sunderson leaned back, Swest was pouring down him, by now. "Okay, Martin. I gave you your chance. You're refusing to take it. I'm chartering the first aircraft I can get hold of and pushing off to Nairobi."

Martin stared at the man, dumbfounded. "You know as well as I do there's only one plane you can get hold of - and wife and four children and you can't fly. That means you and a pilot and one other."

'That's the score." As if to punctuate Sanderson's comment, a heavy explosion, not very far distant, shook the windows violently.

Sanderson's lips had gone blue. He tried to say something but the words would't come out Martin had never seen such neat terror in a man. An HE shell had struck a building and gone off.
Once every few days this had
been happening, but it was considered routine. Patani was known to be almost ludicrously known to be almost used his short of ammunition and his gunners wouldn't have passed a gunners wouldn't have passed brace. recruit course on targe

recruit course on targettice. Probably the HE shell had hit the old quarter how in ruins and unoccupied yet. Sanderson rushed to the window and flung it post, of the sill lay the Polaroid canelly the Polaroid

have you got a Polaroid camera In 1968 Christopher Hodder-Williams' book Fistful of Digits was published. It was the culmination of a number of "Ever known me go off halfyears of campaigning by a group which ranged from Cocked?" Tve never known you pissed enough to do so. But since you won't give me any facts --

computer scientists to psychiatrists. The aim of the campaign was to try to alert society to the impact of information technology — a requirement that grows more urgent as time goes by. In this specially commissioned story for has used the studio to record radio commercials and an Computer Weekly, Hodder-Williams continues his exploration of the way man, machine and society might interact in Digits was published by Coronet books but is at present out

Sanderson grabbed it and took a operator who had come on shift random shot at the brightly lit street outside. Sobbing now, he counted the seconds, then stripped the backing off the plate. A very uninspired colour

photograph of an almost deserted street was the net re-Martin glanced down at it for a

few seconds, then left the room.

HE took over the shift but his mind wasn't on computers. He had seen a man he'd respected suddenly go to pieces as if some unseen metaphysical force had performed psychological vivisection. Having checked that to date and the online systems were in order. Martin went thoughtfully to the phone and dialled a number. To the duty man at the far end he said, "That last shell; where did it go off, do vou know?"

He was told it was a small HIE rocket that had hit a carpet warehouse in Lower Pynt. There were no casualties but a small fire had broken out. Firefighting equipment was on the

"Did anyone photograph it?" Martin asked. "Who'd print It?"

Wilbur, who had strolled up from the data prep room, wanted to know what all the fuss was about.

Martin said, "Why would a man take a shot of an empty street, Wilbur, with a Polaroid camera, just after an HE shell had exploded several miles

3wav2 "Is that the clue to today's Crossword?" But Martin was dialling again.

"It's the clue to something. Get lost, will you?" Wilbur said, "That's all people ever say to me. Get lost. What is it that makes me such a thrill?" "I don't know. Go and play

with a pebble . . . Erika, that "What a time to phone. Are you about to confess? A neighbour has grassed on you, Martin.

be annoyed about it."

'You sound . . . scared."

The one you were so rude

"The one I was so dumb

about. Immediately you've hung

up, get Cindy out of bed. Grab a

few of her toys. Pack a few cans

of fruit juice and cola and milk

and a few cans of food. When

you phone Ngara tell him I

know why he built the garage

with nine foot concrete. Tell him

"Don't ask questions. You're

carrying our baby and you've

also got Cindy. I want you in

"Promise to phone later?"

"And what about you?".

Martin walked briskly

through the airtight doors of the

it's time you all got in there."

"What in God's name—"

that garage."

get the opportunity."

Hang up now."

"About what?"

dive into the lake."

as never before.'

tin paused by the doors. "What

have you got printed out so far? About your unscheduled "Only an error check." "Erika, listen very carefully —

See if you get anything." "Just listen. Phone Ngara the moment I've finished talking. You know that garage he's just

derson's Office. was no need to take a picture. He just stripped the backing off one of the unused plates. The plate was pitch black.

the lights that the test tape was completely blank.
The operator said, "So what's this? African black magio?"
"Don't you know what wipes"

The man caught Martin's look and suddenly became very

"I'll phone you at Ngara's if I rotten little mushroom cloud "I'll tell you all about me when

but it turns you rotten?"
"Got any Nembutal?"
"I'd rather not sir" phone you back at Ngara's. "Please yourself," Martin dialled Ngara's number computer room itself. The

Hodder-Williams himself has a lifestyle that might be typical of the Eighties, as he easily integrates literary and technological activities.

For example, at home he has developed an experimental. recording studio where he has pioneered a practical method of achieving reel-to-reel quality for tape cassettes. And he album of his own piano-accompanied songs. Fistful of

Katine answered Martin said, "Can I speak to

Katine said, "She's trying to

Martin. It comes from Civil

Defence. They want you to use

the census results for zoning all

victims, according to how far

they live from where the bomb

fell. Names, addresses, phone

numbers if any. They request

that you run a special program

to pigeonhule them. Then the

medical people will know who

have a chance, and these people

"Everything okay?" nurse Ngara. When Ngara real-"Sure, Mr Hillman. I hope they don't do another census for a ised you . . . were unprotected he while, though. If we go on at this refused to come in the garage. Instead he phoned Civil rate we'll run out of mag tape." When do you start printing Defence. Ngara was wearing a the results of the census itself?" standard electrometer. He got enough to kill him ten times "The moment it's validated. over. He has a message for you.

Shouldn't be long now. There'll be enough paper to reach from here to the arse end of the Nile when we're through." The squawkbox buzzed. Martin snatched it up. It was Wilbur. speaking from the data prep room. Wilbur said, "Just saw

with him was checking some

printout. Martin asked him,

Sunderson drive off like a scalded cat . . . well, about ten minutes ago. Tyre rubber all over the car park. It may leave a very nasty smell. What cooks?" Martin snapped grimly, "Just let's do our job, Wilbur, What-

ever race Sanderson has just entered, I doubt if he'll win." Just as Martin cleared down on the squawkbox there came unother explosion. It seemed muffled, quite different to the one before. And long before the echo of it had died down. every warning light on the central processor started flashing. At the same time all tape decks

failure; the lights stayed on, the fans continued to run normally. Martin stopped breathing. stood very still, a statue in the computer room. The operator looked up at him, then back at the flashing lights. "Computer's down, Mr Hillman. Why?"

stopped. There was no power

"Because there won't be a thing left on your magnetic tapes. Same applies to the disc packs. Try the tape library and you'll find every tape erased."

"I'm sorry, you've got me puzzled, Mr Hillman, Is this some kind of a joke?" "Do I look as if I'm joking?"

"You look . . . as if you've just seen a ghOSt."

Martin knew the most appro printe reply to this but he didn't give it. "I'm just going down to Mr Sanderson's office."



"It's his camera I want." Mar-

"How's it read?" "We're clear. Ready to roll." "Load a test tape on Deck 2,

Martin dashed down to San-

Martin returned to the com-. puter suite. He could see from

magnetic tape faster than any-

frightened, "No sir: What?" "Radiation" "But," there was ... , hardly a beng at all." Neutron bomb. Leaves a

DOMNIMEGIRSIMASSPECIAL

can be treated. Most important thing, please: blood groups. They must be known. Do you understand those instructions?" Martin did not answer immediately. He could not bring himself to disillusion Ngara on a point of such frony. Not one digit of the census remained in the

computer. Not one line of it had

been printed out. It would take

six months at least to start again

from the next forms that were stacked in the vaults downstairs. He knew that Katine had difficulty in hearing him because her sobs, terrible and deep and long drawn-out, were throbbing down the line.

Martin said, "I understand perfectly . . . Has Erika forgiven me for kissing you?" Christopher Hodder-Williams 1977



Photograph by Geoffrey Sturdy

MCROSYSTEMS,78 MCROSYSTEMS,78

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D1, "It is hopeless to try to make

D2. "In ten years a computer program will be World Chess Champion"?

D3. "There is no reason why a

program based on such 'type

positions' could not be con-

structed. This would require,

however, a rather formidable

D4. "A real success - the pro-

duction of great games and not just the avoidance of

blunders — in the attempt to

mechanise chess must at the

very least teach us a good deal about the nature of thought"?

D5. "Chess problems are the

analysis of the game"?

a machine play perfect

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Ton

Is exhilarating when A cow in the road around the corner

Is relentless when A cow in the road around the corner

Cannot exist when A cow in the road around the corner

Why be afraid of Death when Is just a

Cow in the road around the corner?

Tim Palmer

EPSS-S.W.A.L.K.

I addressed the packet with binary coded. loving care for someone, somewhere was waiting for a message from me

I ordered (inconSequentially) of each byte to form for you (a heartfelt ditty written to standards set by the CCITT)

and although, like eggs on toast, your reply was scrambled in the electronic post, it was no snag to unravel: I YOVE LOU (anag)

keeping in touch is so nice with the Post Office's Experimental Packet Switching Service

Malcolm Peltu

19th Nervous JCL STATEMENT

It really doesn't matter, you know, it's Just a game it's Not important. Not compared with Whether Palace won on Saturday or If Rodney will make it to number One next week The world won't come to an

Won't prevent the Thames flooding most of London before the Barrier is built, won't even Affect the supply of crumpets, stop
The sparrows switching on in Leicester Square

Four pm precisely. And that pretty typist in Not smile tonorrow as the case may be whether I VS on the E-series or

Big O.S. Man

operating system

ever since the early illicit bootstrapping days

but when he failed to update

on The Queue Minder'd list:

Maicolm Peltu

his store protection dues

The Supervisor ordered his privilege bits unset and he was placed

soon to be erased

Tim Palmer

Tidying up

It's been a long shift since the year began, And there is much to shed and shred No time now to try to feed Those valid statements still unfed Into the silent terminal, Nor yet to follow up instead

I've checked the logs, the discs, the tapes. Updated every manual in the place: Slave units' shackles briefly loosed And every bug that I could trace is ironed out;

ldeas, however germinal.

Downtime approaches at a petty pace— Yet still I doubt . . .

I fear that when next year's shift starts All this year's private mess will lie Swept beneath the mind's false floor, Deceiving no one but the eye Of the beholder;

No fresh new start, then? But I-Shall be one year older.

Note for myself for New Year's Day: I've charted the flow of my life so far, Diverted the course of some endless loops; Now document just how things are, And note this fact: Wherever I go, however far, Starts with this act:

Don Mitchell

Really Basic

BASICally speaking you are the API of my core: the program body

You are the end to my each begin and your smile makes

To your each sweet CALL looping round your love routine.

Without you I'd ABEND, for a constant called you; to GOTO

even the ugliest bug grin

Malcolm Peltu

When Elvis died

Where were you when Elvis Presiey died? I was somewhere back in the Sixties in a Chelsea spaghetti factory with you.

IT IS ELEVEN O'CLOCK the very loudspeaker blared TIME FOR THE NEWS. ELVIS PRESLEY HAS DIED.

We laughed, it was so unreal. We had no time for the news that Elvis had died.

But then the wake began and it was Heartbreaking Hotels all through the night

"It's amazing," I said. "The end of an era, the start of old age." "Rubbish," you replied "It doesn't matter at all. He never really lived, so he never really died."

Angry, I turned on you, spaghetti tentacles flaring from my mouth. "Elvis has died, Gods shouldn't die."

Later, Groucho went too.
"Time wounds all heels," he once quipped
Only this time it was fatal.

But you were right, of course. They both live in eternal dream machines

Elvis throbbing in wax grooves. Groucho crouch-walking across a million screens.

I'm afraid I'm still lost somewhere back in the Sixties. Stuck fast in trend-setting glue-

With no wax in which to groove,

no celluloid to keep me warm

Malcolm Peltu

The Watcher

The Watcher stands Witness to the silent mill,

Relics and ruins are Was, and ceased to be.

Time honoured symbols Of Man remain Jutting above Watcher's humble He has no smile

He has no mirth. He has no birth The Watcher stands Atop the hill Witness to the silent mill. A river runs close.

Winding away, He cares but little, It is always there the Next day. ildings echo with the fallings of Man. Down, along the streets they ran.

With a fiery blast, Another day gone, or is it a year? That too remains, a thing of That night which holds Twinkling so bright.

Earth is born. A star looms above, Man was created, Created with love. Now that is gone, Man has fled his wondrous. Faithful, abode. The Watcher stands,

Atop the hill, Witness to the silent Relics and ruins are His to see, All that was and ceased to be.

Watcher, you with mortal eyes, Can your stone body show Earthly surprise? You were the beginning A beginning to the end. Flery angel. Did you have to descend?

Robin Webster

CHESSLAB CHRISTMAS QUIZ

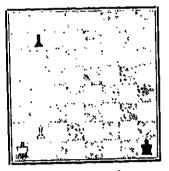
End (of year) games... computer analyses. Bisck is to move and draw: find his only correct move in each case.

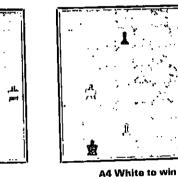
To combat the end-of-year fatigue and lassitude which may pleady have set in, Chesslab this week presents 20 questone guaranteed to stir the system (human, or perhaps even Mes guaranteed to stir the dystein (numer, or perhaps even machine) into action. The quiz was compiled by Danny Kopec and Donald Michie of Edinburgh University, and Michael Clarke of Queen Mary College, London. Answers ppear on page 39.

A. The six king-pawn-king-pawn studies given belew were mnosed with computer assistance. Find White's move in each



A1 White to draw

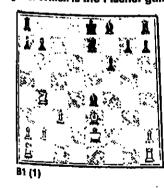


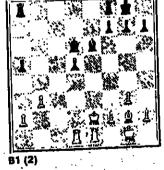


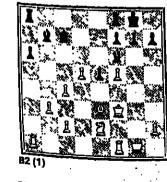


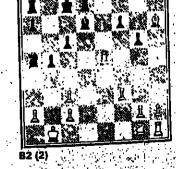


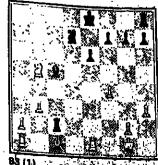
8. In each of the three position-pairs which follow, one is taken from a computer chess tournament and one from a Bobby Fischer

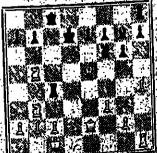












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HEAL-TIME COMPLITER BYSTEMS

Plug-compatible Sigmas through design stages

THE plug-compatible Sigma 9 and Sigma 11 processors under development at Telefile are through their design stages. The Sigma 9 at the beginning of next year," he told Computer Weekly.

The plug-compatible Sigma 9 and Sigma 11 director. "We will begin taking letters of intent for the Sigma 9 at the beginning of next year," he told Computer Weekly.

"We have a Sigma 6, too, and both machine will be used as test-hade for our

should be available in the first quarter of 1979, with the Sigma 11 a little later.

Compared with the Sigma 9 built by the defunct Xerox Corp, the Telefite Sigma 9 will have a number of enhancements, notably a specific processor according to Con. Driscoll, Telefile's European managing

shipping firm

AN online passenger booking system for the British and Irish Steam Packet Co is to be implemented by Leasco Software Ireland. The system will be based on twin Digital Equipment PDP11/70s in Dublin, linked to 50 VDUs in the main offices of the company in the UK

Hardware for the system, valued at £520,000, includes £120,000 for data communications equipment, while software development for the project will cost £200,000.

Due to go live in 1979, the service will process reservations for passengers, cars, and berths. The computer will also handle part of the firm's freight operat-

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Telefile is taking over the lease of the Online booking MDS wins \$10m system for Series 21 business

staking its future, the Series 21 data entry/processing terminal cluster (CW, May 13), has provided the company with about \$10 million worth of business in Europe in 1977. Nearly 600 systems have been ordered or installed by customers. They include Trust House Forte and the Wellcome Foundation in the

Managing director of MDS in the UK, Ray Skinner, says that many of the Series 21 orders placed are for one or two units and could be followed up by multiple orders. Trust House

Series 21 system at its catering division's headquarters at Cheam, Surrey, but plans to install several more at other

About 30 systems have been shipped in the UK to date, and Skinner points out that UK sales should be given a boost early in 1978 with the introduction of an ICL 7502/7503 compatible



not prepared to reveal the value of new contracts picked up for its older products, of which the MDS 2400 key-to-disc system is by far the most important. Some of the latest contracts for MDS 2400 systems include two from the shipping industry. The Mersey Docks and Harbour

machines will be used as test-beds for our add-on memories, printers and so forth. We are also planning to manufacture small disc controllers there. The machines will probably be configured into full systems and sold

at some stage and we will pick up other used

Europe accounted for about

\$35 million of the \$72 million

turnover notched up by MDS

worldwide in the first six months, ended October 31, of its

current financial year. But about

60% of the turnover came from

rentals on installed equipment

as opposed to sales, and MDS is

 \odot

Support for a theory that stars are being born in the less dease outer regions of the Orion nebula has come from computer-sided studies carried out in the US. The large circle in the picture denotes the approximate extent of the invisible gas cloud beyond the nebula itself, while the smaller circles indicate where some of the new stars have formed. The small equares show some of the reference stars used to determine the motions of the stars under study.

How stars are born

suggests that in the case of

Orion, at least, stars are being

born in the less dense areas as

the cloud collapses to a com-

researchers was to analyse the

movements of 140 candidate

stars on an IBM 360/65 at

Southern Florida. The move-

groups of photographic plates

set was taken between 1903

and 1926 at five different

batch between 1968 and 1974.

observatories, and the second

In an attempt to find th

process that enables such stars to form. Dr Gerola is using an

IBM 370/168 at the Watson

Research Centre, to simulate

various chemical reactions

that may occur in the cloud.

within the Service, both existing

and projected."

Also, because of higher payin
the private sector, Christle says

that there is a current turnover

of 20% a year at basic programmer level, with losses also

occurring of senior and chief

increases of more than £1,000 a

year should be made. The major

obstacle here, however, was "the rigid manner in which the

government's pay policy was being applied in the public

To rectify this, immediate pay

programmers.

The technique used by the

mon centre.

COMPUTER-AIDED studies

of instellar gas clouds in the

constellation of Orion have

produced evidence supporting

a theory that stars are being

formed at many points

throughout the cloud as it col-

An analysis of the data

issue of the

obtained appears in the

Astrophysical Journal, and

authors of the article are Dr

Frederick Fallon, of the De-

partment of Physics and Asi-

ronomy, University of South

Florida, Dr Humberto Gerola,

of the IBM Thomas J. Watson

Research Centre, and Dr Sabatino Sofia of the National

Aeronautics and Space Admi-

Conventional theory holds

that stars can be born only in

the dense centre of a gas or

dust cloud, where matter is

of Computing

The main problem at present.

according to the SCPS, was that

several departments or min-

istries" had developed, and that

this led to a "lack of overall control and supervision, the

likely result being the inefficient

use of resources within the Civil

It calls for "a separate

• From front page

November

Company has installed a 2400 to capture payroll and other data for processing on its IBM 370/135 mainframes, while Atlantic Container Line, the Southampton-based international consortium, has ordered a 2400 system and five MDS 6403 communicating data recorders to act as backup to its online network, SPEED (CW, February

Learning from home terminal

the report quoting Earl Joseph's view on the future (CW,

l am deeply disturbed that anyone should seriously consider that learning from a terminal at home is a satisfactory substitute for education at school. The learning of a subject s only one of a number of functions taught at school and very probably not the most important one. When did you last translate Latin prose?

The need for personal and Riding Mill, collective discipline, interacting Northumberland.

with others in a social group and physical education are but a few necessary aspects unlikely to be learned from a terminal. On an even more basic level, what about working Mums?

I hold no brief for teachers, Call for a Ministry

and there may well be a place for terminals to help them, but I do have three school-age children.

This suggestion by Earl

Joseph seems a typical example of technology looking for a problem instead of studying the 'whole task" J. A. B. THOMPSON

CAL national centre WOULD like to correct an national programme, and is dis-

impression that may have been cussing other initiatives to engiven in the article, Project courage and support Computer could lead to CAL Centre (CW,

While it is true that the Cedar project at Imperial College is one of several information services which will be disseminating information about computer assisted learning. Imperial College is not really in a position to take over from the National Development Programme in Computer Assisted Learning as a national centre.

The national centre for com-puter assisted learning after-care, funded by the government following the closure of the NDPCAL, in December, will be based at the Council for Educational Technology for the UK, 3 Devonshire Street, London WIN 2BA. Tel: 01-636 1186.

The council is establishing a number of program exchange schemes in different parts of the country and in different subject areas, based on the work of the

authority with executive powers ng and Com- to be set up to control, coter Managed Learning in col- ordinate and supervise the laboration with established creation, execution and operaputing and education.

Prediction model

I HAVE worked out a computer model to predict sales (within 1-2%) for the ICL/Financial Times National Management Game and would be pleased to participate with any local team entered. This would help toward. my PhD thesis on cybernetics

organisation in the field of com-Programme Organiser (CAL)
Council for Educational Technology, actions louder than words

Service."

more concerned with acting in a professional manner than being regarded as members of a profession, said Ted Cluff, vicechairman of the DPMA. He was addressing a meeting of the BCS operations specialist group last week considering whether operations should be regarded

as a trade or profession. "What really matters is how we as individuals are regarded

DP PERSONNEL should be DISC — an acronym lor more concerned with acting in a Dedication, Integrity, Sincerity and Competence. The other speaker, Dick Wal-

ier, of CAP, said, "In DP, people join as operators or progr mers and in two years they are on £5,000 a year. From then on their income in real terms 80es down because of family commitments and inflation until they retire - a sort of reversed

participate with any local team by others—whether they bemy PhD thesis on cybernetics are behaving in a professional is now apprenticeship. He concluded help toward lieve it to be self-evident that we ions a trade or profession? The are behaving in a professional is not a question I can a is well a firm very strongly had believe it to be self-evident that we ions a trade or profession? It is now apprenticeship. He concluded here in a trade or profession? The self-evident that we ions a trade or profession? It is now apprenticeship. He concluded here is now apprenticeship.

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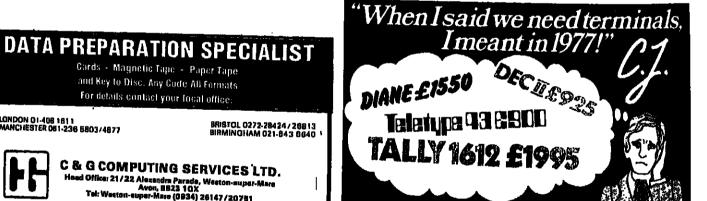
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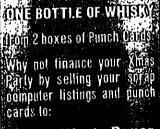
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The Institution of Electrical Engineers is a con-profit making professional body whose main non-profit making professional body whose mulunding is from subscriptions and profits from rcial operations including INSPEC stional Information Service for the

In 1968 it became nocossary to install a computer system to provide a database for the well established abstracts journals could be

INSPEC currently uses an ICL 1902T computer with 64K words core, 8 tape decks, 3 EDS 80's, computer printer, card reader and 2 printers in the foreseeable future this configuration will be up-graded to provide an on-line service utilising a high level language for INSPEC and external customers.

Magnetic tape services are now provided for Magnetic tape services are now provided for companies and universities with computer based information services. This year INSPEC will provide over 150,000 abstracts. The journals and the detabase are distributed world-wide and the information is available on-line through the Europeen Space Agency and the Lockheed Dialog Service based in the United States. Other INSPEC sorvices include selective dissemination of information, key abstracts publications, and company current awareness services. The company current awareness services. The computer systems are also used to produce publications for external users including encyclopaedias and lists of members of professional associations.

The Job

Based at Hitchin in Hortfordalino the Systems Project Leaders will raport to the Systems Controller and will be responsible for providing systems for the production of the database. Th will involve dealing with the user department (producing specifications of systems, costing ar system (both development and running costs) and the production of system specifications for

He or she will also write and test programs implementing the system, provide documentation on the system for the user, the data control section, and produce internal documentation to assist in modification of the

Additionally Analysts Programmers are required who will be offering less qualifications and experience than the Systems Project Leaders. Programmers who wish to move into systems analysis work may also be suitable for these posts.

Candidates

The Candidales must have experience of an assembly language, preferably PLAN. Experience of text file maintenance and computer type-setting systems would be an added

Rewards

A salary in the range £6 400 £5700 will be paid to the Systems Project Leaders, and up to £5000 for Analyst Programmers. There is a contributory pension scheme and free life assurance. The Institution operates flexible working hours, and both posts carry holiday entitlement of 20 days.

Replies should be addressed to John Carmichael, Systems Controller, Institution of Electrical Engineers, Station House, Nightingale Road, Hitchin, Herts



SYSTEMS ANALYSIS

The growth of JCB has been one of the most algnificant developments in the earthmoving equipment industry in the 70's and has established an impressive record of growth, investment and export sales.

A review of all group systems requirements is currently underway and a group systems plan will be produced in the New Year. The Intention is to replace our existing Burroughs B3500 300kb computer, currently operating in a database, and real time teleprocessing environment, with new hardware which could involve distributive processing. We now seek Analysts to implement and develop our new generation of systems.

The major areas are:
the installation and development of real time order processing and stock
control systems, probably using a dedicated computer,
the installation and development of new systems in the financial administration

and sales areas of the company; the development of real-time manufacturing systems in the shop-ticor and material requirements planning areas.

The successful applicants, with experience in any of the above, will be joining a

company committed to long-term growth and where prospects are excellent in an expanding management services environment which is not limited to the UK working environment and generous aid with relocation to rural Staffordshire. Salaries offered, dependent on experience, will be of interest to those currently earning up to \$5,000 and no less than \$24,000.

Please apply, with comprehensive details of your

. C. Bamford Excavators Rocester, Uttoxeter, Staffordehl ST14 5JP,

FURTHER APPOINTMENTS

APPEAR ON PAGES, 18 and 17

bumper Computer A case of wine must be won As it is Christmas, we thought we'd give you a break from our usual list of contracts (although we still have When you've found the answers, cut out the whole at and send it to us. if yours is the first correct set of answers we open, we'll plenty on our books). sendyou a case of wine to the value of £20. Instead, we've devised a little quiz. And we're inviting you, gentle reader, to take part. If it isn't, we've plenty of consolution prizes.

Section 1. Ancient History

1. What and when was Leo? By whom is the computer generally reckoned to have been invented, and when What was the first application of electronic

The Knight

Section 2. Stretch your brainpower and she could stay with her boyfriend. Lateral Thinking Problem

A student owed a huge sum of money to a college bully. The bully, fancying the student's girlfnend, proposed a bargain. He told them that he would put a black pebble and a white pebble into an empty pencil-case and then the girl would have to pick out The black pebble would mean that the debt was

cancelled and she would become his girlfriend. The white pebble would mean that the debt was cancelled

They were standing on a pebble-strewn plath and as the bully bent down to pick up the pebbles, the gut noticed. that he picked up two black pelither and put them into Afraid of pointing out his distionesty, what should she do?

Section 3. Cunning computations

Working from the left, multiply the third whole number by the fourth decimal. 0.6, 3, 9, 0.7, 0.1, 0.8, 2, 4, 0.5 Find the number which completes the serie 7, 9, 40, 74, 1526 Which one of the following numbers does not belong with the others? 625, 361, 256, 197, 144

Section 4. Making shapes





Section 5. Keeping a clear head Follow a series of complex instructions. Work carefully Do exactly what each sentence tells you to do:

1. If there are five colours in the rainbowignore the next sentence. Write the first letter of the 11th word in

the next sentence in the box. If pigs are pink and giraffes can fly, draw a cross inside the box. Draw a circle inside the box. If you still have not writte anything in the box write the sum of the number of days in a week and the

2. If London is a large City and 12 – 3 is less than 4; write the third letter in the sixth word of this sentence in the box. Write the letter M in the box. If the third day after Sunday is Friday, and there are always 28 days in February ignore the next sentence. If the empty write the second letter of the

alphabet in it. If the box is not empty write

Easy, wasn't it? Now all you have to do is cut out this whole advertisement and send it to Anne Kingsley at the address below, to arrive not later than January 3rd, 1978.





Knight Computer Services Limited Old Park Lane, London WIY ANL, Tel: 01-491 4706.

Consultant

circa £9,000

A consultant is required to join a busy team primarily engaged on city assignments. Candidates will have a sound d.p. background with particular emphasis on financial applications, say, Banking, Insurance and Stockbroking. Additionally, the key function will be client liaison, therefore applicants must be personable and have the ability to communicate effectively with senior management. This is an excellent opportunity to work for a reputable consultancy organisation and to make a significant contribution to the company's growth. A substantial starting salary will be paid to attract high calibre candidates.

Contact Margaret Stevens

COBOL Programmers

Middlesex Interesting development work is offered by this well known manufacturing company, who have an IBM370 running CICS under DOS/VS. Vacancies are also available to junior programmers who are seeking good experience and career prospects.

Contact Mike Creamer

Customer Engineers Midlands & N.W.

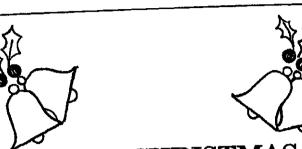
c.£4,500 + OT plus car Experienced Customer Engineers are required in the Midlands and North West area by an international minicomputer manufacturer. The main function is to provide a first line maintenance service of computer systems, but the successful candidates will be expected to assist in solving any of the clients problems.

Applicants should have at least two years in a field engineering environment. Preference will be given to those with formal qualifications such as ONC in Electronics.

Excellent opportunities to work in a professional organisation. Contact Margaret Stevens AUSTRALIA

If you are a programmer systems analyst, or higher level, with at least three years post-training experience and thinking of emigrating then we can help and advise you. This extends from initial career prospects assessment to acquisition of a suitable and worthwhile position in Australia. In addition we arrange for you to receive a comprehensive information package which will assist in making accurate cost and living standard comparisons in advance: we can also advise on migration procedures and time scales. Great opportunities, salaries, and prospects.

Contact Mike Creamer



MERRY CHRISTMAS

and a prosperous New Year
We would like to extend our best wishes to everyone for
Christmas. In the New Year we wish you happiness, good fortune and success.

Systems & Programming Staff

The British Transport Docks Board Computer Centre provides computer systems development and operations services to 19 ports and other port transport organisations. The Centre, established in 1969, is shortly to undertake a major review of the ports' computer system requirements with a view to extending the present wide range of computer applications and the replacement of the existing large mainfrance computer at the Centre.

Responsible for systems analysis, design, development, implementation and maintenance activities and liaison with programming, operations and user staff. Previous experience of systems work is essential.

To assist Systems Analysts as required. Some previous data processing or accounting experience is desirable but training will be given where appropriate.

Reports to the Systems & Programming Manager. Responsible for program design, it is specification, coding and testing. Will manage programming staff and linise with systems and operations staff.

To implement the significant and challenging projects already outlined and also to provide continuing support for the existing systems, we require the following stall:

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Systems Analyst

Trainee Systems Analyst

Senior Programmer

Programmers

Salaries to £5,000 \

Regards from: Jim, Margaret and Mike

For further information on any of the above vacancies please contact the appropriate consultant. If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

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Europe — Holland **Contracts 1978**

C.C. B.V. based in Amsterdam have been asked by clients in Holland to cate the following personnel to commence contract work early in 1978.

- Programmers IBM Cobol DOS and/or OS.
- Analyst Programmers Programmers Minis Assembler --- Process Control, etc.
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me of these positions could lead to permanent appointments at high aries commensurate with standards and costs of Holland.

ephone Bill Seymour on 01-549 3212 for further information or direct to dy Ellis in Amsterdam (020) 461844.

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staete, Amsteldijk 166, Amsterdam 1010. Telephone 461844 Telex 11336 4 Whold Street, Kingston upon Thames, Surrey, England, Telephone 01:549 3212 Telex 27950



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The work is mainly of a statistical salure in the creation and enalysis of data bank and preference will be given to applicants with experience of programming in a lightwel language and the use of latistical packages. Persons with university degree will be condesed for training.

Selary according to qualifications and experience will be on a scale (2005-£3191 per annum.

pplications giving the names or two referees should be sent by 8th January, 1978, to Miss Dorsen Watson, Adminis-trative Assistant (Appoint-ments), University of Exeter, Exeter EX4 4QJ, Please quote reference no. 1/38/8447.

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West London c E5760 p.s. hone 01-439 6481 (24 hours) EFFECTIA GRAVIS

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2 SYSTEMS ANALYSTS

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Candidates considering furthering their career in the New Year should complete the application form below and return it to our London, Dublin or Amsterdam office.

> For specific appointments see our advertisement in Computer Weekly on 5th January 1978

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Mainteining standards in the recruitment trustless the CSA has established a recruitment division away at a trust of the code of conduct

The aposition will include Tony Miller of Funesh Miller of Stand Physical Teaco, John Wood of EMS. George Parints of the NCC, John Goldsmith for Humphries of Knight Computer Services and Naville 14th 31 Oct. Charman of the CSA Recruitment

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Session 7:

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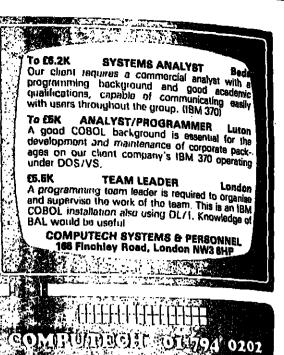
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measurex

(IRELAND) LIMITED

A leading manufacturer of digital computer integrated measurement and control systems, continues to expand its operations in Ireland, Measurex manufactures its systems for the European market in a facility located in Waterford, Ireland. In order to further serve the needs of this market and broaden the base of its Irish operations, an expanded Engineering Group has been established and will be located in Cork, Ireland. The Groups responsibilities will be as follows.

Manufacture of all computer software and control products across Measurex's product line in the Paper, Pulping, Energy Management, Rubber, Plastics, and Metal Industries.

Support of the introduction of new products into the European market. Implementation of product enhancements in co-ordination with California-based Measurex Corporate Engineering Department.

The following job opportunities exist:-

SENIOR CONTROL ENGINEERS Salary up to £9,500 per annum

DUTIES:

To work initially as a member of an engineering team involved in specification, planning, implementation and commissioning of computer-based digital measurement and control systems for the Pulp and Paper Industries in Europe.

Advancement possibilities to Project Leader with suitable qualifications and experience. Job will focus on control/applications knowledge as implemented in Software for industrial control systems. The successful candidate will hold a good Engineering or Science degree in a relevant discipline with several years varied experience of the analysis and control of industrial processes, preferably in the Pulp and Paper Industries. Experience in the use of digital computers is highly desirable. Travel throughout Europe will be required.

CONTROL ENGINEERS Salary up to £7,000 p.a.

DUTIES:

To work as a member of an engineering team involved in specification planning and comissioning of computer-based digital measurement and control systems for industrial processes. The successful candidate will hold a good Engineering or Science degree in a relevant discipline. One to four years experience in the field of process control in the Paper, Rubber, Plastics or Metals industries desirable. Experience in the use of digital computers is highly desirable. Travel throughout Europe will be required.

SOFTWARE ENGINEERS Salary up to £7,000 p.a.

To work on the development and manufacturing of computer-based digital mesurement and control systems in the Paper, Rubber, Plastics or Metal industries. To be involved in the installation and start-up phases of these systems. The successful candidate will hold a good Engineering or Science degree with course work in Digital Computing and Computer Programming, Experience in assembly level programming of Real-Time Computer systems is highly desirable. Travel throughout Europe will be

SOFTWARE TECHNICIANS Salary up to £4,000 p.a.

DUTIES:

To work under the direction of a Software Engineer in the building, assembly, and testing of the software associated with computer-based digital control systems. The successful candidate will have completed secondary education and had some exposure to digital computers and some knowledge of computer programming; of key importance is an alert mind and a willingness to learn.

There is a contributory pension scheme and a bonus scheme. Relocation allowances will be payable if appropriate.

Reply in confidence to: Colin McNaught, Engineering Manager, Measurex (Ireland) Ltd., Industrial Estate, Waterford. Telephone 051-32151

University College Hospital

Systems/Designer **Programmer**

There is a vacancy in the Pathology Department for a Systems Designer/Programmer to work on the further development and expansion of a data management and

The system is being developed on a Modular One computer with disc backing store and multiple terminals. The job offers considerable scope for experience in design, prog ramming and implementing a computer system in a real time environment. The successful applicant will be expected to adopt a disciplined professional approach, and must be used to working to time schedules.

Applicants should have at least 2 years' experience in computing. A knowledge of Modular One, Coral 66, or Medical Computing would also be advantageous.

Salary within range £4.408 to £5.218 inclusive

Application forms and further information can be obtained from the Personnel Department, University College Hospital, Gower Street WC1E 6AU, Tele: 01-387 9300 Ext. 381 quoting refs: CW/SDP/BP. Closing date 30th December.

LIVERPOOL AREA PROGRAMMERS to £4.500

We require

18 months' COBOL experience in a commercial environment

 A challenging career with an expanding company
 Work on the latest hardware on a variety of projects from design to installation

opment to analyst duties for right people.

061-427 311 **BCT** Systems

80-82 St Mary's Road, Garston, Liverpool

LEEDS Programmers Progression to Analysis c.£4500

• the chance to learn database, real-time and

applications programming in COBOL and CORAL plenty of development work

 good cureer prospects in a major international marketing and manufacturing group On behalf of our clients, we are looking for ambitious

upwards of 11s years' practical experience ON ANY MACHINE in a commercial environment

a good educational background and a high degree of self

 the aptitude to develop into systems analysis in du course, with appropriate training Relocation assistance will be given where applicable. Initial nterviews will be held in Leeds or London, whichever is the

if this excellent career opening appeals to you, please ring us in complete confidence, or write briefly, quoting ref. 918. Messages will be recorded after hours.



CAREER LAUNCH! PROGRAMMER/ANALYST-PROJ. LEADER

Fast expanding, energetic young Company (part of an established multi-milion C U N organisation) with trainending growth plans in the Condon area (already well relativished in other parts of the 11 K.) surprish peerly out to find deep native and management projected to meet the growing demands that increased business is making. Take this opportunity to pump from the nonlimit on to the scalete is surcoss. If you have 3 F years experience with a programming background preferably Colon) is Commans and applications from the clothy— Cell now Ref. CS 1989.

DD executive (KINGSTON) 01-546 9473

UNIVERSITY COLLEGE

OF SWANSEA

Shift Leader

The Shuft Leader is responsible for the work of a teem operating an ICL 1904S, with outbrisks links to departments and other computes contres on a 24-hour, 5 days a wook, three-shuft cycle Applicants should preferably have at least these years' experience of continuous operating and some supervisory experience. A knowledge of George 3 would be an advantage.

Senior Computer Operator

he Sanior Computer Operator will work under the direction of a Shift eader on the ICL 1904S. Applicants hould have a minimum of two years

The safery scales will be as lollows, plue a shift allowance of £370 per annum for both posts
Shift Leader £3189-£3898. Senior Computer Operator (2800-(3434 per amum

Further particulars and application forms (two copies) may be obtained from the Personnel Officer, University College of Swansen, Singleton Perk Swansee, SA2 8PP, to whom they should be relumed by Friday, January 13th, 1978.

LONDON SCHOOL OF HYBIENE AND TROPICAL MEDICINE

ASSISTANT SUPERVISOR

(COMPUTER TERMINAL)

The post carries responsibility for the day-to-day management of an R.J. E. Cardraeder plus hineprinten terminal. Servicing the requirements of some 40 researchers working on medical surviys. No previous experience in computing is necessary, but organisational skill and the ability to mit with people and so supervise more junior staff are separatel qualities.

About twe welke Butto holiday, nd shrift work, focusion has rightenham Court Road, social feelings. Salary, departuring on spine force, etc., on ascard from 23.218 to 25.799; inolugive for campidates with "O" levels.

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MYRIAD **APPOINTMENTS** Computer Personnel Consultants

PERFORMANCE MEASUREMENT

NEAR READING

£6000-£8500

A key department within our client's organisation comprises an elite team specialising in Performance Measurement and the Comparative Evaluation of various hardware and software products offered by major manufacturers.

The department is presently being expanded and a number of additional staff are required who have experience in carrying out benchmarking exercises using hardware monitors and other sophisticated techniques. In addition to organising system performance trials the positions call for a high degree of individual flair and initiative in resetting to find the property of the property comparative situations

Whilst candidates should bring expertise in any area of hardware or software formance measurement, specialist knowledge in any one of the following would

● ICL 1900/2900 under GEORGE/Systems B or K

Univac 1100 under EXEC-8. Honeywell Series 60/64-60/66.

Burroughs 8700/800 series

The successful candidates will have the opportunity of broadening their horizons to a wide range of products and keeping abreast with the latest hardware and software

The Company has substantial interests throughout the world and provides its employees with extremely good conditions of employment and considerable scope for career advencement.

> Please telephone for a confidential discussion or write to: 30 Ficet Street London EC4Y AA

MERRY XMAS AND

Operators Nr. Hounslow To £4.000 inc.

Several vacancies dust for mornal three shift working for ICL GII propile Cantéen four weeks hole. Flexitime, etc. Nice company CW80/1,

Operator N. London

To £3,800 inc. If you have large IBM experience apply new DS HASP would be ideal. Lots of parks are lading

Operator Nr. Maidstone c. £4.000

A famous high street organisation requires an operator with sound IBM DOS-VS experience Company discounts etc. two shift system CW

Two Senior Analysts £6,500 to £8.000

You must have live years DP experience and be a really competent commercial IBM systems analyst. It would be nice to have COBOL DOS as part of your background and the ability to manage large systems. Challenging position. CW50/5, Annexts.

Systems Analyst Sierra Leone £10K

An opening exists for minimum one year in WEST AFRICA for an analyst with 1 or 2 years WEST APRICA for an analyst with 1 or 2 years systems experience it is essential that the supplicant also has 0 & M in their background and an adduct plus is knowing the IBM System/3 Single people would be preferred A liquid agreement will be provided CW50/8.

New Sales Support & Sales Posts—UK

A major international computer manufacturer is annutricing in Europe an exciting proven range of small computers in the New Year. They therefore immediately require experienced Systems Analysts Salesman and Technical Support Presiminel in swell in SUK Training Officer. Previous experience should be with RPGILtype computers or main computers using commercial skills with a professional approach to problem solving. Personnel will have a marvellous opportunity to get in on the ground floor where salenes will be very competitive. Vacancius exist in W. LONDON, BIRMINGHAM, MANCHESTER and LEEDS CW50/4, Michael.



DATA EXPRESS HOUSE PROSPECT PLACE **HEATHFIELD TERRACE** CHISWICK W4 3BR

Recruitment Consultants

01-995 3883 or 01-958 6138 evenings **Programmers Hemel Hempstead** c. £5,000

Are there any of you who have commercial FORTRAN? Good then this multinational firm in Horts, with top ports including free funches and non C.P.5 is tooking to you! Univer experience would be ideal but other machines acceptable CW60/7. Annette. **Senior Programmer**

to £7,500 A very successful commercial service bureau

having an IBM DOS computer, needs an experienced COBOL programmer with more than the average ability. Must onjoy meeting and advising clients. L.V.s. C.P.s. etc. CW50/8.

SYSTEM CONSULTANT LONDON SOPHISTICATED COMMERCIAL SYSTEMS to £7,000

Our Clients have enjoyed substantial success in the UK and Europe this year based on market-leading.

To prepare for 1978 and continued growth, they wish to identity TWO JUNIOR CONSULTANTS in key positions in a prime grea of the group. The challenge to the successful candidates will involve day-to-day liaison with clients, providing consultancy and education support, whilst helping to implement and use Payroli and related Applications Packages.

Essentially you will possess:

* A relevant commercial background.

* Systems experience, ideally coupled with a programming background, gained in either an IBM or ICL.

As you will provide front line support to major customers at all levels, a professional attitude presentability, and effective communication are essential qualities.

This is an excellent opportunity to gain creative business experience in a competitive, rewarding 01-935 0G71

CONTACT: DAVE SCARLETT

CW/12/16

SPECIALIST COMPUTER RECRUITMENT LTD. BIRMINGHAM 021-236 3781 FREEPOST Freepost, Equity and Law House, 35-37 Great Charles Street Queensway, Birmingham B3 2BR

MANCHESTER 061-833 0676 FREEPOST

Freepost, Corn Exchange Buildings, Corporation Street, Manchester M4 8BD

LONDON 01-935 0671 FREEPOST 6
Preepost 6, 102, Blandford Street, London WIE 1JZ
Association



WILL YOU HAVE A

SERIES/1 IN YOUR CHRISTMAS STOCKING?

Programmers with Assembler experience are required to join Altergo. These vacancies offer unrivalled opportunities for programmers to work on some of the first Series/1 application projects in

The right people will join the strongest team of computing specialists in the country, where a constant interchange of ideas and experience create a stimulating working environment.

Altergo offer all the benefits befitting a successful and dynamic company including a high salary, expenses, overtime, bonus scheme and overseas

Give yourself a Christmas present, contact

The Polytechnic of North London

LONDON POLYTECHNICS Analyst Programmer

Opportunity for person with knowledge of Cobol to Join educational computer unit. We require a versatile programmer to take charge of the student records system and other administrative projects. The post offers scope for someone with programming experience to expand either into systems analysis or systems on programming.

Systems Programmer

FTOGI ZHALITOS

Experienced programmer to Join a
team doing software maintenance
and enhancement, user support,
and software revaluation, and
documentation. A degree or
professional equivalent is required;
lamiliarity with 1900s or Dec-10s an
experience with microprocessors
would be an adventuge. The hardwarn: ICL 1905E (96K), soon to be replaced by a new machine; full ange of peripherals, plus access to a

Dec 10.

The salary: Both posts are on a scale up to 1228 of to 2208 (including top to 1228 of to 2208 (including London Weighting and Phuse 2 supplement) depending on qualifications and experience.

LANCASTER HESEARCH ASSISTANT DEPARTMENT OF COMPUTER STUDIES

THE UNIVERSITY OF

Atons and invited for the post of ARCH ARSHETANT in this Quant of Computer Studies, and with the appeal of the Computer Studies, and with the appeal of the Own Missing addressly for the Own of MOVA and SCLESS make by Experience of an aspite the Computer of the Computer

... A HAPPY NEW JOB! RPG II Programmers £4,000-£6,500 +

LONDON & H. COUNTIES

Operators to Shift

LONDON & HOME COUNTIES

Technical Authors

W. London & Herts.

Successful Salesmen

to £12K quota earnings

Contract Programmers

£2,000-£4,000 (incl.)

We have many vacancies covering all types of mechines and locations. Some firms will retrain from one manufacturer to another Remember, these positions are for shift working only Hurry whilst stocks last. CW 50/13, Patricla.

Leaders

We now have eight commercial companies who have vacancies for RPG II programmers and Analysi Programmers. Jobs exist in C London, W London, Middx High Wycombe, Craydon and in Dorset, Most firms offer LVs. 4 weeks holiday, etc. CW 50/12, Annatte.

Time Sharing Programmers to £6,000

If you have had time sharing experience involving the use of FORTRAN. BASIC or ASSEMBLER, then we have four nationally known companies who would offer you an exclung job in pre- or post-sales support. Some offer generous bonus schemes. CW 5/9, Michael.

Systems Consultants £6,000-£9,500 CENTRAL LONDON

Seven large wall-established consultancies wish to recruit systems people with all-round experience on third generation equipment and the right personality to deal with clents who require first rate service. Technical communications consultants are sto required where in-depth implementation experience of IBM or ICL 1/P massage switching networks stc., are assential. Excellent frings benefits and prospects. CW 80/10, Michael.

Mini Computer **Programmers** to £6,950

Your experience is required now. A very large number of vacancies are registered where a knowledge of Assembler or communications experience is essential. (VGR programmers would also be considered. Opportunities exist at S.W. A.W. or W. London. Surrey, Herts and Manchester in this exciting and rewarding field. There has also been registered some oversees goets to people with 5 or more years in mini-omputers. GW 50711. Milohael.

DATA EXPRESS HOUSE PROSPECT PLACE HEATHFIELD TERRACE CHISWICKW4 3BR

CHISWICKW4 3BR

CHISWICKW4 3BR

Recruitment Consultants

Recruitment Consultants

Recruitment Consultants

CHISWICKW4 3BR

Recruitment Consultants

Recruitment Consultants

CO1-995 3883 or

CO1-958 6138 evenings

U.K.

to £240 p.w.

Immediate requirements for IBM, RPG II IBM COBOL under DOS or DS for C. London RL/1 OS or CICR PDP/11 or good IMS for various locations for three months plus Asia IBM vacancies in Europa. Asia or the Contracts. Difficer on 01-886 2236. STOP PRESSOR LEM VACANGIES IN HOLLAND FOR CONTRACT STAFF.

Four manufacturing companies are looking for competent technical woters with mini or main-frame experience. CW 50/14. Michael. U.K.
We now have ton different firms for both hardware and systems only compenies who are anxious to meet successful satesmen in this industry. They must have previous relevant small systems experience (come VCRs will be considered). All firms have belows schemes and cars or car ellowance. Most positions in S.E. England, but 2 in Midlands. CW, 50/15. Middeel.

MYRIAD OPERATIONS Computer Personnel Consultants

Myriad would like to hear from OPERATIONS PERSON-

NEL seeking a career move in London or the Home Counties. Telephone our Operations Consultant for a confidential discussion, whether or not you see the job you want listed below. We will not release your details to any organisaiton without your consent.

ICL OPERATOR

OS OPERATORS

1½ shifts at present.

OPERATORS

DOS/VS

perience.

No shifts. International

manufacturing organi-

sation. Ability to work

Insurance company, new

machine, recently installed.

City, Middlesex, Surrey, S.

East and West London. Lots

of opportunities if you have

nine months' plus ex-

c. £3300

£3900

SHIFT LEADER DOS/VS, POWER

Supervisory experience and self-motivation are import-E.C.3

S.W.1 To £4750

BURROUGHS

Operator, min. 18 mths. MCP. Service bureau offers good prospects. To £4500

SENIOR OPERATOR

Three shifts, 2 years' DOS/ VS experience. Ambition and enthusiasm are called

N.W.1

To £4500

Please telephone for a confidential discussion of write to 301 leet Street London EC4YTAA

01-353 0981

Glaxo Holdings Limited

Operations Manager $c \pm 7,500$

Glaxo Holdings is the parent company of a leading international group, with a turnover exceeding £400 million, which conducts research and develops, manufactures and markets a range of pharmaceuticals, foods and

The Group Computer Centre provides a batch and on-line financial and management information service to the executive directors and senior management of the parent company and in addition offers a remote job entry facility to one of the major manufacturing subsidiaries, using a newly installed ICL 1903T 128K operating under George 2+. Data preparation work is performed on Kode Datavet equipment.

A vacancy has now arisen for an Operations Manager to take control of the operations section, comprising a total of 16 people. It is anticipated that the man or woman appointed will be aged between 27 – 35, possibly a graduate, with at least 5 years' significant experience in computing including a minimum of 2 years in an operations management capacity, preferably in a 1900

This is a senior appointment reporting directly to the Data Processing Manager. Total first year income will be in the region of £7,500, including both London allowance and bonus. The Company offers an excellent conditions of employment package and assistance with re-location expenses will be given where appropriate.

Please write, giving brief career details, to:- P. A. Drew, Glaxo Holdings Limited, Clarges House, 6-12 Clarges Street, London W 1Y 8DH.

UNIVERSITY OF CAPE TOWN

SENIOR LECTURER IN COMPUTER SCIENCE

incations are invited for the above post vacant from 1st January, 1979. The inclimbent will be required to teach eigraduate and postgraduate courses. Preference will be given to applicants whose main areas of interest are in or, more of the major fields of non-numerical computing, gardcularity () programming languages; (ii) artificial ligence. (iii) management information systems. The minimum requirement is a Master's degree of equivalent comment will be made, according to qualifications and experience; on the telety scale R8 450 x 360 — R9 900. (i) — R1 1250 per annum, plus a pansionable ellowance of 10% of bests salary. Rests should submit a curriculum vites; stating when expliable, if appointed, present salary, publications and such work, and should give the names and addresses of three referees:

In a major of the salary of Cape 1 own, Private sag. (deboach 7700, South Africa, by whom applications must be received in light than 14th January 1978.)

TECHNICAL OPERATIONS MANAGER

£5600 - £6500 p.a. plus car

As a result of our continuing expansion in the United Kingdom, we require an experienced Computer Professional to assist us in the development of our computerisation programme.

The Technical Operations Manager will manage the operation of an existing installation using a minicomputer and assist with the implementation of new applications involving the introduction of a second Installation during 1978. He/she will be responsible for the management of both installations and should be prepared to work flexible hours to approximately 8 p.m. (and occasionally later) Tuesday to Saturday.

The successful applicant, who is likely to be aged 25-35, must have a knowledge of R.P.G. or other high level language. Previous experience of installing a mini computer would be an advantage

Conditions of employment are those normally associated with a progressive international Company and include a Company car, pension scheme, subsidised conteen and special facilities for car

Handwritten applications should be addressed to --

Mr. K.R. Broome, Administration and Personnel Manager, Citroen Cars Ltd... Mill Street, Slough, Berkshire.

CITROEN



Polysar International SA is the Overseas Soles Organisation to a Canadian owned international Group engaged in the manufacture and sales of synthetic rubber, latices and plustics. established in Fribourg. Switzerland since 1962 We have in interesting opening in our EDP Department for an

ANALYST/PROGRAMMER

Applicants should be graduates in Economics/Finance of associated disciplines who have proven experience in a commercial organisation. At least two years' EDP background with some exposure in the analysis field, ideally involving international operations, as well as strong programming ability with amphasis on COBOL and/or RPG-II are essential requirements for this position. Linguistical knowledge should include fluency in English and French.

The successful candidate will be entrusted with varied and interesting work assignments. A certain amount of his time will be spent outside Switzerland We offer fair remuneration commensurate with qualification and performance, and social benefits expected from a progressive Company.

If you are interested in this opening please send your resume to

The Assistant Personnol Menager Polyser International S.A. 10, Rte. de Besumont CH-1701 Fribourg/Switzerland

CAREER OPPORTUNITY IN COMPUTER ANALYSIS AND PROGRAMMING

The bank for international settlements, an international institution situated in Basie, Switzerland, has a vacancy for an Analyst/Programmer in its Technical Services

Requirements: a minimum of 5 years' experience implementing applications of a banking or accounting nature in support of on-line systems, preferably in PL/1 and Assembler. A good command of English is required as well as a sound working knowledge of French or German. The successful candidate will be employed initially in the Accounting Section for a period of about 16 months and will later essist in programming the bank's on-line systems. He or she might eventually be appointed supervisor of the application programming

The BIS offers interesting and challenging work, a competitive starting salary and substantial staff benefits, such as lirst-class pension and welfare schemes, a staff restaurant and a sports club.

A detailed curriculum vitae, accompanied by references A detailed curriculum/vitae, accompanied by references and a teriant cholograph, should be submitted to Mr. S. Hillbert, Sub-Manager, Personnel, Bank for International/Settlements, P. O. Box 252 CH 4002 Bealer, Switzerland. Applications will be treated in strict took.

FALMER JEANS LIMITED

require a

DATA **PROCESSING MANAGER**

We have recently ordered a B.1800 computer system to be installed at our distribution and administration centre in Essex. We are fast expending and operate from several locations in the U.K.

The position offers an outstanding opportunity to a person wishing to progress in management and play a central role in the development of a new and advanced system.

The salary is negotiable, dependent on age and experience and will be in the range £5,000 to £8,000 per annum.

Please write with full details of age, qualifications, experience and current salary, to:

Mr. K. Wright Falmer Jeans Limited Claydons Lane Rayleigh, Essex

FALMERS

RACS

SYSTEMS ANALYST c£5100 PROGRAMMER/PROJECT

> LEADERS c £4000-£4900

Applications are invited from persons with the relovan commercial, programming and analyst experience to join a development team ungaged on a number of challenging

The installation comprises on IBM (707) 45 running under DOS/VS and CRS/VS, and in addition to an on-line system using 3270s, we have a retail store system with point of sale terminals and other remote terminals.

Please write giving brief details of expenses and age to

Financial Controller Royal Arsenal Co-operative Society Ltd. 147 Powle Street, Woolwich, London SE18 6JN or telephone: 01-854 2000 Ext. 418

LONDON BOROUGH OF ENFIELD

Systems Analyst/ **Programmer**

£4,161-£4,507

Applications are invited for this appointment in the Computer Section of the Borough Treasurer's Department. Candidates should be experienced COBOL Programmers, preferably with systems training or experience.

The Borough's computer installation currently consists of a 64K [CL 1902T and planned expansion includes 7502 ter-

An application form is obtainable, upon receipt of a foolecap s.a.e., from the Borough Treasurer, P.O. Box 54, Civic Centre, Silver Street, Enfield, ENI 3XF. Closing date 6th January, 1978. Please quote reference ORA/58.

> MEDICAL RESEARCH COUNCIL Institute of Hearing Research University of Nottingham

SYSTEMS PROGRAMMER

This is a responsible post in a new and expanding research unit which will provide opportunity to colleborate with members of the accountion stall. Applicants should opportunity to colleborate with members of the accountion stall. Applicants should have a good graduate qualification in Computer Science and some expansance of both have a good graduate qualification in Computer Science and some segment and the selection of a good graduation. The institute will be determined and synthesis of sounds respected to sensit in the selection of a powerful 16-bit computer configuration will be expected to exist in the selection of a powerful 16-bit computer configuration and in evaluating suppliers, date base management systems. Writing interfaces to and in evaluating suppliers, date base management systems, which in itself accounts your property sould be sensitively routines for novel real-time populations will form, a major part of the duties. Recently qualified candidicates are normally appointed initially in the Technical Research Officer pateografy (Selevy scale 13267-24456). Both salary scales include all Research Officer pateografy (Selevy scale 13267-24456). Both salary scales include all gray supplements.

Purither delicates and application forms are systallable from the Opranter, interface applications and the segment.

Segment therefore a many tile agrabet.

DATA PROCESSING MANAGER **NORTHANTS** SALARY 0£5,000 P.A.

"MAKE 1978 YOUR YEAR"

Our client, a market leader in its field, currently operating a new IBM system 3 mainframe, wish to recruit a computer professional with a programming and systems background to head the Data Processing Department.

ideally, candidates should be aged between 25 and 40 and should have:

* RPG II and/or COBOL programming experience, combined with some knowledge of systems. the personal qualities needed to haise with senior members of the company, the desire to progress into a management role.

The company are engaged in active systems development plans to include: Budgetary planning (corporate modelling)/Product Analysis (wholesale and retailing)/Personnel Data/Costings (factory products)/Retail Management information system.

The position would appeal to a data processing professional, capable of accepting a stimulating

Normal large company benefits apply and include: extensive discounts on company products, a contributory pension scheme, four weeks' holiday, free BUPA and assistance with relocation. If you feel you have the experience and personal qualities needed to accept a management role, contact without delay:

REG HEATH

ON: 021-236 3781

REF. NO. CW/12/99

SPECIALIST COMPUTER RECRUITMENT LTD.

BIRMINGHAM 021-236 3781 FREEPOST Reepost, Equity and Law House, 35-37 Great Charles Street Queensway, Birmingham B32BR

MANCHESTER 061-833 0676 FREEPOST Freepost, Corn Exchange Buildings, Corporation Street, Manchester M48BD

LONDON 01-935 0671 FREEPOST 6 Freepost 6, 102, Blandford Street, London WiE 1JZ



Portsmouth Highbury Technical College

Programmer/Analyst

A now ICL 2903 has recently been installed and will provide a computing facility for use by all the departments of the College.

The successful applicant, to commence January, 1978, will be required to provide a programming and advisory service for the development of applications and systems software.

Applicants should be of graduate or equivalent adjucational standard and preferably have had at least one year's programming experience in COBOL and/or FOHTRAN or ALGOL.

Salary: £3,395 to £3,773 for AP 3 and £3,861 to £4,214 for AP 4

Application Forms from The Secretary, Highbury Technical College, Portamouth PO6 2SA (enclose SAE) or Coshum 83131 (Ext. 247).

CONTRACTS MANAGER

With the growth and success of our con-

require an additional member of staff to

concentrate exclusively on the negotiation

of contracts with clients and the place

tract division, force 8 Computer Services

Croydon Based

ment of contract staff.

SENIOR SHIFT COMPUTER OPERATOR

Hinckley

British Gas has a network of real-time computers which is used to monitor and control the National Gas Transmission Grid. A vacancy exists for a Senior Shift Computer Operator to complete a leam providing continuous operational support of he machines.

Applicants should have at least 2 years' operating experience, preferably on large real-time systems. Four 'O' levels or equivalent qualifications are normally required but the ability to think clearly. metimes under pressure and to work unsupervised on varying work-loads, could be more

his is a responsible job on a system of considerable technical interest. Housing in the immediate area is very reasonably priced; the cities of Loicster, Coventry, Nottingham and Birmingham are within easy reach. Working conditions are excelat with good opportunities for leisure activities ^{outside} working hours.

Salary is from £3990-£4874, inclusive of 26% shift allowance and salary supplements. For further preliminary details

lelephone Mr G. P. Brown on (0455) 38111 Ext. 2173 PS/708001(705)

BRITISH GAS



MANAGER

Required by our clients for their IBM system 3 installing for sunt with RPG til end depails of convolling a small number of shaft.

of convolling a small number of shaft.

An attractive salary is offered plus usual, frings bandling Please contact.

E. C. Stubbe.

Trafferd King Association of 01 872 2151-

The person required may be a Senior Programmer or already established in this kind of job. You must be outgoing, interasted in people and now wanting to develop your career,

Please telepirane 01.680 3761 for further details or write enclosing a C.V. to further details or write enclosing a C.V. to Force & Computer Services. 8 Milat Walk. Craydon.

OPPORTUNITIES TELEPROCESSING

EXCEPTIONAL

MIDDLESEX

SALES

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Opportunities exist for dynamic computer sales executives to join one of the largest and best known groups of companies in the U.K. A major subsidiary of this £500M organisation has recently announced a revolutionary telecommunications and computer concept which they are actively marketing in the United Kingdom and Europe.

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. COMPUTER WEEKLY, December 15/22, 1977

A story of

DAVID cleared his desk there. I'd better get back to Helen before the competit with the dedication of a

Bradstreet back on the ion gets in." shelf, diary in his top drawer, the draft of his latest proposal into the filing leaving only a faint suggcabinet, gold-plated Parker into his inside pocket, the Daily Telegraph into the

his black Samsonite, until only the two letters He was aware of the chatter and rock-and-roll of the in-house festivitles drifting up from the floor

below, heavy breathing to a euphoria, but their siren call held no attraction for him. Instead, he stared out on a neon-spangled London

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a good general knowledge of computer hardware end software, ideally including mini computers and

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orally

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THE SALES BIT

Christmas postal sorter. Kompass and

Suddenly Pete was gone estion of stale tobacco

Yes, the office party, why not? Sure, his wife would be waste-paper basket and a wafer thin calculator into working pretty hard right now, last minute shopping, collecting the kids, tidying up the spare bedroom for the inevitable in-laws, perhaps baking or some extra decoration. Yes she'd be busy all right, and he ought to go and help her - but. well, maybe just for half an hour. I mean, it wouldn't look right not putting in an

appearance at all He opened the other letfrom the vantage of his 14th ter just to get the situation straight in his mind. "Dear Mr Crosby, we are floor pigeon-hole and

hectic office below and

could detect the abandoned

laughter of the heavy breasted Helen above the

chat and lobbying hubbub.

Clearly Peter's presentation

had not had the sensual

effect he had hoped for.
Perhaps it's time I tried

my Jean-Paul Sartre routine.

been a good bird puller.

Puzzle answer

THE two types of roof face

ientary parts o

thought, that's always

TRADER

wondered how many of the 84 Christmas cards which pleased to offer you the post of Yes, they had dehe had sent to clients and prospects of varying potential were witnessing

finitely offered him the job. He felt quite chuffed. After slmilar celebrations within all they were a well restheir electric typewriter pected company with probjungle. The context of the ably the best kit in the marketpiace. It could be . rambling internal memo good move for him. Certfrom his sales manager ainly it augmented his carcould have been expressed eer pattern. Yet it was all so in a single sentence. "Well unsettling, and what was worse, he had inflicted the done David, now do twice as much next year." insecurity upon himself by

He found himself torn applying for the job in the between the ego boost and first place. cyclic futility that were Anyway, no more dwelimplicit within the comling on the topic, he decided. munication. So he was top The first chance he got over salesman again. Sure he enjoyed the thrill of the chase with his wife. She always had a sensible contribution to make. Yes, definitely the

and ultimate success — but what was he really best plan of action Further thought was David abandoned the abandoned as Pete came sullen gin and tonic and through the office door, went through the door almost forgetting to open it, which still oscillated with as he conveyed a half pint the recent departure of the glass of gin and tonic amorous Peter. He decrowned with a forlorn scended the stairs to the piece of waterlogged lemon.

David casually turned the papers face down on the "Come on man, what are you doing here? Things are really moving downstairs. Here, I brought you a drink." "Sure," David heard himself saying. "Just had to tidy up a few things. How's it going with the beautiful Helen?"

"We're on to the philo-Bishop Berkeleys. "The sophy of existence at the meaning of sex in the moment. All I have to do is switch into my Omar Khayyam routine. Live today, for tomorrow we die today for tomorrow we di - and I'm home and dry. at least, not too late. Anyway, I'll see you down

answers

ANSWERS to the Christmas Chessiab Quiz

Al: Kf1; A2; Kb1: A3; Kg3; A4; Kc3; A5: c3-c4; A6:

d4-d5.
B1(1) Iron-Fish v. Chute
1.2; (2) Fischer v. Nicevski,
Zagreb 1970.
B2 (1) Fischer v. Hamman, Natariya 1968; (2) Sortie v. Chess 4.4
B3(1) Diughess v. Iron
Fish; (2) Fischer v. CameraSlegan 1970. (All computer
positions are from US Combuter. Championship 1976,
by D. N. L. Levy).
1. C1. Ng8, C2. No3ch; C3.
Kb7. C4. Ko8, C5. No6ch;
C6. Kc7.

1970. (All computer are complementary parts of mare from US Com a regular pentagon, and Championship 1976, their slope angles are also complementary. With the roof ridges pointed in the roof ridges pointed in the roof ridges pointed in the hair of faces shifting on each edge will form a complete pentagon. The rofal shape is this of David H. Old a regular dodecahed on the pointed parts of the pointed of the p

ANSWARE

North Sea Oil Exploration and Production

Unional Company of Great Britain, a subsidiary of Union

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and extending an existing geophysical/geological mapping and

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NEWS IN BRIEF

Viewdata goes to Zurich

HIGHLIGHTING the export potential of the Post Office's Viewdata service, a conference on Viewdata is to be held next year in Zurich by Butler, Cox and Partners in collaboration with the Post Office.

The Zurich conference will be held on March 2 and a similar conference will be held in Birmingham on February 14.

The conferences will follow the format of a successful London conference held earlier this year, the transcript of which is now available for £80. Details of the conferences and the transcript can be obtained from Butler, Cox and Partners, The Press Centre, 76 Shoe Lane, London EC4 3JB.

New factory

THE Scottish manufacturer of banking terminals and word processing equipment, Fortronic (Fife), has opened a second factory at Fife, adding 14,000 square feet to its production and development space.

Compeda board

TO further strengthen its marketing and support subsidiary Compeda, the National Research Development Corp. has appointed its financial director, David Thomson, as chairman. Another NRDC officer, Thomas Fellows, is to serve as a part-time board

French Bill

THE French privacy and protection Bill, which had its first reading two months ago (CW, October 13), has been heavily amended in the Senate, and returns to the National Assembly for a second reading this

THE JOB

THE PERSON

1977—that was the year when the micro came into its own

the microprocessor emerged as a major catalyst in making the computer community, and society as a whole, more aware of the impact that information technology is likely to have on all aspects of society.

It was also the year of IBM price cuts and the switch of Geoffrey Cross from ICL managing director to GEC Stateside company hunter; a year of increased recognition for the computer services business and a major shortage of skilled computer staff.

These were some of the most commonly quoted events of the year according to an endof-year survey by Computer Weekly which asked a number

of industry experts, "What were the highlights of 1977?"

David Firnberg, director of the National Computing Centre, pointed to the need for studies at national level to analyse the impact of information technology.

"The year saw the emergence of real concern among an ncreasing number of people that the availability of aggressively sold, cheap and mass produced computer sto-



rage and processing devices had widespread implications and that these implications both good and bad, ought to be seriously studied at a national level," he said.

The Computer Weekly/ ACM conference on "Can Computers save Britain?" (CW, July 14), held at Hedsor Park, was cited by the director of the government's Central Computer Agency, Reay Atkinson, as one of the most mportant events of the year which helped to crystallise attention on the impact of information technology.

He also felt that microcomputers were now having an impact not only on computer

One of the Hedsor speakers. consultant lann Barron, coincd the phrase "transputer" to signify the impact of the micro.

"The single-chip micro is rimarily concerned with what s happening outside the processor whereas the traditional mainframe and minicomputer are primarily concerned with the computational activity within the computer."

For the services industry, 1977 was the year when that side of the business achieved recognition by both the public and private sectors, according to the director general of Computing Services Associaton, Alan Benjamin

"This was the year it all happened for us." he said. "Our collaborative studies with the government crystallised this year and there were big organsations in both sectors giving major system development contracts to systems houses. And it's now becoming recognised that part of a computing professional's career should be spent in the services industry because of the standards and the levels of

the importance of a viable national software business with "a welcome intervention by the NEB through the formation of the Insac computer services company," was emphasised by ASTMS national organiser, Tim Webb.

But, he added, "although trade union membership continued to grow among computer staff, it was not a good year for the industry as a whole, with government pay policy creating a major obstacle in recruiting qualified technical staff on to frozen saiary scales."

For Neville Taylor, chairman of the Data Processing Management Association, 1977 would be remembered for the start of the mini/micro revolution coupled with an increasing emphasis on the user. Professor Paul Samet, BCS president, and director of the computing centre at University College, London, said that 1977 saw the beginning of a realisation that distributed processing systems will change the nature of computer departments and the way they will work.

up CAD research programm architecture and building

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(F:)

is to be the subject of a m research programme initie the Department of the vironment. As a first # Systems Simulation Ltd been commissioned to defin work plan for the project.

The DoE research aim coordinate experience computer aided design building and to improve t standing of its capabilities current limitations.

The man-computer int is seen as a particularly of area for these systems, and Department expects to exa experience from several in including hospitals and gen business systems.

The research will consider particular tools techniques and may recommendations on the D own system, Cedar 3, which about to enter an evalu

Systems Simulation din Alan Sutcliffe feels that e optimism about computer building design was justified.

"There is a lot more to dol the enthusiasts thought. the time to take stock and where we must go," he said

"There are many good of puter systems available." continued, "but the bigs problem remains archite resistance to their use.

Japan to

cut tariffs on imported mainframes and peripherals has been reported in the US, but the Japanese Ministry of International Trade and Industry says no decision has been reached.

Japan is under considerable pressure from both the US and the EEC to cut tariffs on a broad front in order to give a stimulus to the world economy and cut back its enormous foreign trade surplus.



COMPUTER AUTOMATION **ALPHA 16 LSI-2 NAKED MINI LSI-2**

HPAC has developed a CORAL 66 compiler for COMPUTE AUTOMATION's LSI-2 comparable to the powerful RMS CORAL 66 compiler for the PDP-11. The same source program have been compiled under each of the compilers and run will identical of the compilers and run will identical of the compilers. identical effect on the respective computers.

Full information on both compilers is available.

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_ow costs of labour attract investment in UK the multinational subpany had not completed the management and software skills committee of the Neddy computer sector working party. The survey was conducted questionnaire was that it would have to reveal proprietary in-

THE low cost of labour, good and use of the English language are factors which attract investment in the UK by foreignowned computer companies. But the availability of a larger skilled labour force and better inancial inducements in the rest of the EEC are powerful inducements for investment to be made in other European

countries. These were the main findings of a study of the investment criteria used by multinational companies operating in the UK. The study is being carried out by

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which is the largest independent computer maintenance company providing third party total system maintenance

to larger users, outside the USA. The job locations are in the Greater London area and Home Counties. Salary

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of its record and, to match present performance,

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among 15 multinational companies, although only nine completed a questionnaire prepared by the sub-committee. The other companies are discussing the factors covered by the questionnaire in meetings with the sub-committee.

Although the sub-committee's interim report says that it was "disappointed" at the overall response to the questionnaire, as it had followed discussions with the companies involved, it was atisfied with the co-operation received from the companies hrough a series of meetings

vhich are still being held. A DEC spokeswoman said

formation, but that the company had subsequently had a "long and fruitful" meeting with Neddy representatives.

Other companies which did not fill in the questionnaire were IBM, Burroughs, CDC, Olivetti and Siemens. Companies completing the questionnaire were Data General, Interdata, NCR, Nixdorf, Univac, Hewlett Packard, Honeywell, Philips and Raytheon Cossor.

In its report, the subcommittee says that it expects the UK balance of payments deficit for computer trade to worsen in 1977 from last year's deficit of £110 million.

'Prepare for bloodbath'

By Keith Jones

for a bloodbath. This warning was made at a leasing seminar in the US by Sonny Monosson, president of the Boston-based consultancy, the American Computer Appraisal Service.

One of the main causes of the disaster, according to cover provided on residual diligence" in their remarketing.

LEASING companies that have assigned inflated residual values Lloyd's of London — a problem assigned inflated residual values to their clients' IBM 370 highlighted last week (CW, Dc

Monosson pointed out that the leasing of new large computers had been very easy with Lloyd's underwriters guaranteeing the revenues from them, but leasing companies had been blind to the fine print in the Monosson, will be leasing companies' reliance on the insurance would have to exercise "due



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